Cia. Salitrera de Tocopilla, formerly the Compañia H. B. Sloman, with four properties on the Pampa of Toco. The Cia Salitrera Alemana owns five oficinas, all situated on the Taltal Pampa; Salpeterwerke Gildemeister A. G., has three works in Tarapacá, and the Salpeterwerke Augusta Victoria A. G., one oficina, in Antofagasta. The well-known Italian firm of Pedro Perfetti owns five oficinas in Taltal.

The nationals who most notably increased their interest in nitrate properties during and immediately after the war were the enterprising Jugo-Slavs who have of late years taken a considerable part in Chilean development work. The largest of the Jugo-Slav firms is that of Baburizza Lukinovic, with five well-equipped oficinas in the Antofagasta district. Several other European-owned oficinas passed into Slavic hands before the stagnation of the market set in.

Two North American firms own nitrate oficinas. The Dupont Nitrate Company operates two properties in Taltal from which about 30,000 tons are annually shipped, but since all this product goes directly to the Dupont explosives works in the United States, the market is not interested in the output. W. R. Grace and Company, doing a general export and import trade and employing their own steamers, operate nitrate works in Tarapacá, with a production of about 45,000 tons.

A few years ago pessimists prophesied that the Chilean nitrate fields would be exhausted by the year 1923. Careful examinations carried out by the national authorities as well as by individual companies have definitely allayed any fear of this kind. Surveys made under the auspices of the Chilean Government by the distinguished engineer Francisco Castillo showed that nitrate fields properly tested, owned and in operation,

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cover some 2244 square miles, while outside that area there are at least 75,000 square miles of undeveloped nitrate-bearing lands — chiefly in the hands of the Government of Chile. With, thus, over 95 per cent of the deposits untouched it is reasonable to expect a long life for this industry.

From the fields of Tarapacá and Antofagasta 60,000,000 tons of the chemical have been taken since the beginning of overseas exports, and it is estimated that in the comparatively small surveyed and operating area there are about 240,000,000 tons in sight, a quantity sufficient to fill the world's needs for at least another century at the present rate of supply. This is without taking into consideration the huge body of less readily accessible nitrate lands referred to in Dr. Castillo's conservative report, which included no deposits containing less than 17 per cent of nitrate, nor layers of less than twelve inches in thickness unless exceptionally rich.

The Caliche

Into the highly controversial question of the origin of the nitrate-bearing deposits it is unprofitable to go deeply, since, as in the case of petroleum, scientists have not agreed upon a theory. Several have been put forward, and a good deal of study and research has been devoted to the problem, but with no final result, a definite objection tripping up even the most likely suggestions. The most generally supported theory is that which was expounded in its original form by Darwin, postulating the long submergence of this part of the West Coast under the sea, its gradual rise through volcanic action, and the slow drainage and drying of masses upheaved from the Pacific floor. Remains of shellfish are occasionally found imbedded in the caliche,

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and the presence of iodine is also adduced as contributory evidence; but bromine is curiously absent, and the question is complicated by other geological displays, some of which certainly seem to prove that before the subsidence of this belt in the Pacific the land was high and dry, clothed with thick forests.

I listened once upon a burning afternoon in the nitrate pampas to the seriously held theory that the caliche drained down, under the soil, from the mountains, and that the particular beds upon which my good friend was operating owed their origin to Lake Poopó, a turquoise gem near the railway line leading to Bolivia; the beds, it was insisted, seeped slowly from the lake and were being pushed up from underneath by subterranean pressure. Another theory credits the volcanos of the Andes with the production of sufficient ammoniated steam to create chemical changes upon the pampas; others suggest the union of oxygen and nitrogen in the air during electric storms, forming nitric acid which, in contact with lime, might produce nitrate of lime; this, if coming into touch with sulphate of soda, might form nitrate of soda, releasing the sulphate of lime.

He who prefers a less technical theory may agree that nitrogen deposits are derived from the guano of seabirds, found along the Pacific coast.

The terminology of the nitrate pampas is a proof of its old recognition. The *chuca* is the loose, often friable, decomposed top layer, from two to twelve inches thick. Below it comes the *costra*, a hard, rocky agglomeration of cemented clay, porphyry and feldspar amalgamated with sulphates of calcium, potash and soda, often also containing traces of nitrate of soda and common salt. Third comes the *tapa*, the immediate shield of the nitrate of soda beds, composed of fragments of nitrate, of salt, sand and clay. These three layers form mat-

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tresses from a few inches to three or even six feet in depth, and owing to the hardness of the costra must be blasted away from the precious fourth layer, the *caliche* proper.

The caliche bed varies remarkably in thickness and in position, sometimes offering a thin, sand-mixed, layer of little value, and at other times revealing itself as a beautiful shining snow-white bed several feet in thickness; its hue varies from pure white to grey, sandy, and even violet, and its consistency may be sometimes loose and porous, while in other regions it is as hard as marble. The best caliche contains as much as 70 per cent of nitrate, and by the present methods of extraction it is not considered worth while to operate deposits containing less than 14 to 15 per cent. The average in Tarapacá and Antofagasta runs to about 20 per cent. Below the caliche is the *conjelo*, another fairly loose layer of sand and clay, salts, selenite crystals and traces of nitrate; still farther down is another plainly differentiated stratum, called the *coba*, with a comparatively high percentage of water, a heavy proportion of clay, calcium sulphate, and other minor components. The nitrate is often carried through several of the protecting layers, and foreign matter is frequently found mixed with the caliche, yet the different strata almost invariably exist in readily distinguishable and undisturbed beds.

The process of preparation for the market is simple. The caliche, thoroughly crushed by heavy machinery, is tipped into immense tanks and covered with water: coils of pipes fixed in these vats heat the mass to a high temperature and the nitrate of sodium, readily soluble in boiling water, dissolves. The other ingredients of the caliche fortunately are not so easily dissolved, and settle to the bottom of the tanks, so that when the

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water is drawn off and cooled the nitrate crystallises in a high grade of purity. There is a moment to be watched for in drawing off the liquor, however; common salt (sodium chloride) is frequently present in the caliche in unwanted quantities, dissolving with the same readiness as the nitrate. But it begins to precipitate before the nitrate, and the right time for withdrawing the liquor is when the salt has settled and the nitrate is immediately following it. The nitrate-charged water crystallises on the floor and sides of the shallow *bateas* (vats, generally of wood) into which it is passed, the process of cooling and crystallisation taking from 20 to 40 hours. The liquor is then pumped away, part being used for the manutacture ot iodine according to the amount permitted to the oficina by the central Association, while the nitrate crystals are gathered in large pans for a few days for draining, and afterwards spread upon the cemented open planes, the *canchas*, for two weeks until thoroughly dry; it is then ready for bagging. It is during the drying stage on the cancha that nitrate in large quantities, all over the pampas, would be spoiled by dissolution if heavy rain should fall — a phenomenon of such rare and unlikely occurrence that it is not taken into consideration. The belt is not absolutely rainless, Iquique claiming a rainfall of half an inch per annum, while the Antofagasta Pampa has received showers four times in the last fifteen years; heavy fogs, too, not infrequently invade the pampas. But it would take a series of terrific deluges for moisture to filter through the protecting crusts above the caliche, and this sometimes suggested danger is not in sight.

The "commercial standard" of purity which exported nitrate must attain for sales to agricultural regions is 95 per cent, but 96 per cent and over is reached in shipments destined to explosives factories. The cost of

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production of necessity fluctuates with the prices paid for wages, fuel and equipment, but was reckoned by Dr. Enrique Cuevas, in 1916, to work out at a minimum of two shillings, or fifty American cents, for each Spanish quintal of 101 pounds weight. During 1921 the cost was reckoned at double this amount. Expenses tend to increase year by year, with higher wages and costs of food and fuel, as well as new charges such as that recently added by the Employers' Liability Laws of Chile. Antofagasta reckons that the cost of living increased 300 per cent between the middle of 1914 and the middle of 1921: it is certainly no less upon the inland nitrate fields, where all merchandise has an extra rail journey, every gallon of water is piped long distances from the mountains, and it is common to bring cattle for slaughter overland from northwest Argentina, the animals being shod for the three or four weeks' march over rough trails. The only method of reducing costs is by improved scientific production, and to this aim the work of the best companies is constantly and successfully directed.

Iodine is extracted from the "mother liquor" that has already deposited its burden of nitrate of soda and of common salt, and which is, after the extraction of iodine, returned to the first lixiviation tanks to serve again in dissolution of new loads of the raw caliche. The purple-black iodine crystals, of so pungent a quality that a whiff from the store-room is almost blinding, are packed into strong little wooden casks for export. A couple of big oficinas could, between them, manufacture enough iodine in a year to supply the world's needs, but to prevent glutting of the market there is an agreement with the Producers' Association by which the amount of this chemical made by each nitrate plant is strictly regulated.

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A Desert Industry

Before the realization of the properties of nitrate and its commercial exploitation upon a great scale, the burning pampas of Tarapacá and Antofagasta were solitudes, shunned by all animal life. This region, whose products were destined to give new life to a million cultivated fields, to bring orchards and groves all over the world into magnificent flower and fruit, lacked the ability to produce so much as a blade of grass. Forming a continuous stretch of arid country with the long deserts north of Copiapó, the major part of this strip shelters no life that has not been artificially introduced.

Yet today this region presents the liveliest scenes of the West Coast. Where a solitary waste lay under the sun, railways cross the desert with loads of heavy bags of chemicals; tall chimneys rise into the quivering air, the grey tin roofs of the nitrate works dot the pampas thickly. Each nitrate plant is the centre of an artificial town, to which every drop of water must be piped, every article of clothing, food, every scrap of wood and metal needed for dwellings and oficina must be carried. The ground is pitted with the marks of the *tiros*, the test blastings made in all directions to discover the quality and position of the nitrate stratum; and one may stand upon any small rise in the richest nitrate pampas and count a dozen or more of the long flat "dumps" of waste material that denote the active working of an oficina.

The scene appears to have no elements of beauty, for there is no hue but that of the sandy desert, the grey and black of the oficinas and the gleam of railway tracks; the outlines of the scored and pitted ground, the railway cars, the smoking chimneys, are harsh. Yet there is a sense of energy and prosperity, of intelligent activity, and in the pure dry air of the pampa almost

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everyone experiences a feeling of splendid health and well-being.

Above the flat desert is an enormous bowl of clear, transparent sky and one looks far away to distances that seem endless. At sunrise and sunset the effects of light upon the sky and pampa are of a beauty never seen but in expanses such as these. I have watched the sky in an Antofagasta nitrate pampa when, as the sun fell swiftly, all the arch flushed with rose, and quickly flooded with sheets of purest violet while the orange and umber pampa took on deep amethyst shadows; before pastel or paint could record the sight, all the sky was transformed in a clear luminous lemon-yellow, upon whose bright surface streams of translucent green presently ran. The high peaks of far-distant Andes appeared as if floating, the snow-crowned heads of San Pedro and San Pablo alone visible against the changing sky, fading at last into the mantle of sapphire that gradually shrouded pampa and heights, with nothing moving but a host of brilliant stars, sparkling like diamonds on a live hand.

In a few moments after sundown the scorching heat has given place to sharp cold, and he who rides by night across these deserts must carry a heavy woollen poncho; one sleeps indoors under blankets. Dawn is a miracle of pink and pearl, and in at the window comes the scent of the cherished flowers in the little garden, glistening with dew. The new day is an of indescribable freshness and serenity. Long before noon the sun is pouring vertical floods of sunshine upon the desert, the very sand seems to quiver with heat, and a relentless scorching breath seems to fill the world. But to this all-the-year-round heat the foreigner soon becomes accustomed — everyone, as a matter of fact, workers and officials alike, is a "foreigner" to this pampa; human life is imported

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like every other commodity here. But the children born of white parents in the nitrate fields are strong and sturdy, and it is not surprising that they who have lived for a year or two on the pampas find themselves restless in other places, suffer a feeling of constraint, a longing for these wide skies and far horizons.

The great development of the nitrate industry has created during the last forty years a series of ports along the Pacific, and brought to this once desolate coast, where there existed only a few fishing villages or outlets for desultorily-worked mines, a population which today exceeds 350,000. The workers directly engaged in the extraction, preparation and shipment of nitrate number about 70,000, about 50,000 of these being employed upon 173 oficinas, when all are in operation.

Nitrate During and After the War

When the writer last visited the Antofagasta Pampas, the nitrate business was just recovering after a period of post-war depression and the series of big works were getting back into the full swing of activity. The industry had been enormously prosperous just before the outbreak of war in 1914, but experienced very sudden reverses when the dislocation of shipping checked shipments. At the beginning of 1915 only 35 oficinas were in operation. A certain confusion was also occasioned by the fact that several big producers were German, but the accumulated stocks of these firms were eventually taken over and sold by the Chilean Government. At the time when the future looked gloomy, with oficinas idle and large stocks piled up in the warehouses of the nitrate ports, the great war call for nitrate in the manufacture of high explosives began, resulting in a new wave of prosperity. Shipping had to be found by

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the Allies for the transport of the chemical, and the ports of the pampa regions showed tremendous activity. But with the cessation of hostilities the urgent demands of manufacturers of explosives in the United States and Europe came to an end and the pre-war market offered by farmers did not immediately resume its calls. Shipping gradually returned to ordinary commercial channels, the scarcity of freight for normal commerce was at once apparent, and the rates that consequently prevailed were too high for profitable shipment of nitrate at the prices to which it fell. Many oficinas closed down. But in early 1920 a healthy reaction set in. Agriculturists began buying again, and added to this cheerful effect the industry was reassured by the non-materialisation of many threatening prophesies of the serious nature of the competition to be offered by artificially-produced nitrate.

The work of the active Asociación de Productores de Salitre de Chile first made itself felt in 1920. As its name implies, the group comprises firms engaged in Chilean nitrate production, practically every company subscribing with the exception of the two North American operators and a few small oficinas. Formed by the same energetic firms who previously organised, in 1889, the widely-spread Committee of Nitrate propaganda, the Asociación goes farther in that it controls the output of nitrate of soda and of iodine, agrees upon a price, f.o.b. in Chile, for these products, and deals with international distribution. Maintaining committees in London and Berlin, the Association has also opened branches in France, Belgium, Holland, Italy, Spain, Scandinavia, Egypt, Yugo-Slavia, India, South Africa, Japan, China, and all over North and South America, these delegations being added to wherever prospects for the consumption of nitrate are presented. The Asso-

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ciation's main object is to obviate the violent fluctuations of price that have threatened the industry from time to time; to watch markets closely and to avoid overloading them by retaining a check upon output. The Association's headquarters are in Valparaiso, in constant cable communication with international centres. The effect of the work of this voluntary combine, upon which such other powerful groups as the Eastern rubber planters look with something like envy, has been undeniably beneficial although no efforts can counteract the adverse results of slackened demand.

In 1913 the price per Spanish quintal was eight shillings f.o.b. in Chile, or about $2 United States currency, while freight to British ports cost twenty-three shillings per ton, New York charges running about $6. Nitrate is packed into bags of two quintals each, ten bags thus weighing a little more than an English ton. During the war the price rose to thirteen shillings per quintal, but fell to between nine and ten shillings in 1919. Owing to a strong reawakened demand, plus the work of the Association, the price rose in 1920 until about the middle of the year it stood at seventeen shillings per quintal for deliveries in the spring of 1921, and even with freights ranging from £5 to £12 a ton to London, and $30 to $50 to New York, a handsome profit remained to producer and distributor. This prosperous period lasted until the general world paralyzation of markets was felt, and the big Government nitrate stocks of the United States and Europe were released. In 1921 the international dealers, with stocks of high-priced nitrate on their hands, faced the delayed post-war slump, and formed a pool to maintain prices at fourteen shillings per quintal. Sales were reduced to vanishing point, and the way was opened for more extensive rivalry from the sulphate of ammonia trade;

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eventually the pool agreed to lower prices upon an arrangement with the Nitrate Producers' Association, by which £1,500,000 was accepted as part compensation. This sum is collected by a small levy upon all nitrate exported. Prices were then reduced to eleven shillings per quintal up to December, 1921, and to 10 s. 3 d. for deliveries in the spring of 1922. At these prices trade revived appreciably, and the world's need for nitrogenous fertilisers set freights moving again.

Continuing for more than a year, the nitrate crisis affected no one more acutely than the Government of Chile, for in addition to finding themselves suddenly deprived of the most substantial part of their national revenues, they were faced with a staggering amount of unemployment. The oficinas, of which all but 45 were forced to close as a result of the moribund market, discharged some 40,000 men. There is no work in the Desert of Atacama apart from nitrate and copper industries; the land produces no food and there is nowhere to live. A stream of unemployed workers was almost immediately directed southwards, and while a proportion was absorbed by the farming and milling industries of the agricultural zones, numbers remained in the vicinity of the capital, a source of considerable anxiety. At one time it was reported that 10,000 men were camped out near Santiago, a charge upon the Government, and although the authorities were active in seeking to find employment on a series of public works, these plans were rendered difficult by the financial straits of the nation. The administration of Sr. Arturo Alessandri went into office with many schemes for the betterment of living conditions in the working classes, but has been seriously hampered by the economic trials that beset Chile within a few months of the change of government.

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It is scarcely to be expected that the Government should see eye to eye with the nitrate producers in the question of sustained export at a time of market depression. The nitrate companies argue that it is useless to produce and attempt to export a commodity for which there is no demand, with immense stocks already choking international warehouses: that any such action would lower the price of nitrate to a level ruinous to the holders of the existing stocks and be bound to react disastrously upon nitrate producers. The Government rejoins that they desire a general lowering of nitrate prices, so that the fertiliser should be bought in larger quantities; they want to see a continuation of large quantities produced and exported, in order that workmen should not be, as during the 1921 crisis, thrown upon the country's hands, and also in order that export dues should continue to fill national coffers. To this the producers reply that there is one ready means of lowering nitrate prices, and that is to take off or to substantially reduce the Government export taxes, amounting to £2.11. 4. per ton. As a matter of fact, there has been serious consideration of a governmental project to purchase the nitrate output direct from producers, reselling it to world markets free of tax, or with a very light duty. Here again plans are stultified first by lack of funds and secondly by lack of public enthusiasm for nationalisation of industries in the face of the world's experience during the last ten years. There is a wide recognition of the fact that the nitrate industry has been built up by private enterprise of a kind invaluable to young countries.

He who tries to understand the nitrate situation is much hampered by different calculations of weights and costs, and will sympathise with the complaint of Don Alejandro Bertrand, who remarks that in statistics

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of the industry one finds "production and export of nitrate expressed in Spanish quintals of forty-six kilograms; prices quoted in pounds sterling per English ton of 1015 kilograms; while the British financial reviews vary, some giving the prices in shillings and pence per English hundredweight, while others quote pounds, shillings and pence per English ton. The Latin countries quote in francs, liras or pesetas, whose sterling exchange value varies, while Hamburg quotes in marks per zentner of 50 kilos." Quotations also vary, continues the Inspector for the Chilean Government of Nitrate Propaganda services, according to whether the chemical is sold in Chile, where prices are always "free on board," or free alongside vessel, or whether they are sold including ship freight to Europe or when placed in wagons at the port.

There are today 173 oficinas upon the *pampas salitreras* of Chile. At the commencement of the commercial development of the fields, British capital and technique was foremost in the work, the efforts of the well-known Colonel North contributing largely towards the active interest of British investors. Chileans themselves have long been keen developers of nitrate properties and considerable investors; today their share is higher than that of any other nationality — a situation unusual in Spanish American countries, where industries are frequently left to foreign companies to a degree unhealthy for everyone concerned. The Chilean's enterprise and business sense have indeed carried him far afield, his interests in Bolivia covering 60 per cent of the silver and tin mines.

The social system upon all oficinas is necessarily the same: dwellings and food supplies for the workers must be the consideration of the company, and in consequence large camp stores (*despachos*) are always main-

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tained in which goods are sold to employés. Certain objections to this system are always heard, but it is here unavoidable; in all good and well-managed oficinas these stores are stocked amply, prices being kept down to a limit at or just above cost price. There is always a keen demand for workers, and no nitrate camp would retain its employés if conditions were not those uniformly regarded as just. The chief social difficulty of the oficinas is in keeping off company lands the enterprising piratical provision and liquor sellers who are likely to demoralise and rob. The only remedy is enclosure of the properties and fencing is becoming more usual. At one time the boundary of a nitrate grant was fixed by a string and a heap of stones, but since the Chilean Government has taken steps to regularise estates there has been less of the happy-go-lucky system of limits.

The acute·interest of the authorities of Chile in the nitrate industry is due to the fact that it constitutes the chief source of national income. Over 60 per cent of Chilean revenues are derived from the export tax of two shillings and four pence per quintal, paid partly in paper and partly in gold, the total sum amounting in prosperous years to £7,000,000 or £8,000,000 sterling, or between $35,000,000 and $40,000,000 United States currency.

The tax is a heavy one, and equally weighty imposts are placed upon iodine, also a product of the nitrate oficinas. The product of the wonderful borax lake, in upper Antofagasta, on the edge of the Bolivian boundary, pays a similar tax, yet the considerable export of copper from Chile goes free. This unequal treatment of the different natural riches of the soil is frequently explained by the fact that copper is mined in many parts of the world and therefore the Chilean product

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must meet competition, an impossible feat if its cost were raised by the imposition of export dues. If, however, the cost of production of Chilean bar copper by the Guggenheim group is correctly estimated at eleven cents per pound, it is fairly plain that at the time during the war when Europe was paying twenty-six or twenty-seven cents per pound for this commodity it might have yielded a return to the country of origin.

Of the nitrate ports, Antofagasta is today the most lively and agreeable, although Iquique is still a rival in quantities of the chemical exported. Just north of Antofagasta lies Mejillones, the old port established in colonial days, but its equipment was found to be inadequate after the acquisition of this territory by Chile, and the creation of modern facilities and a modern city was decided upon. People who live in Antofagasta are proud of the place with excellent reason. The approach by train from the south is through ramshackle, happy-go-lucky fringes that have tacked themselves on, but the city itself is well equipped. Streets are wide, clean and well paved; shops are filled with merchandise from London, Paris and New York, and are not extravagant in price. Office buildings, many of which house the representatives of nitrate railways, nitrate and iodine companies, agencies of copper and borax companies, of shipping lines, brokers and several foreign and native banks, are spacious and well equipped; the telephone service compares well with that of many cities of ten times the size of Antofagasta, with its 70,000 inhabitants. Hotels are comfortable, service courteous, and tariffs less than one might expect in a city with not a single meadow or orchard within hundreds of miles, deriving all that it consumes from the Chilean farming lands farther south,

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from the packing-houses of Magellanes territory and wheat fields of the centre and south, or from the sugar and fruit regions of Peru or markets overseas.

The public park is an object of admiration of every visitor coming from the barren coast farther north or from the Atacama copper country to the south; it has been sedulously nursed into greenness that is the more remarkable since Antofagasta's water supply is piped from the foothills 200 miles away — through lands so arid that more than once a fox of the deserts, driven with thirst, has followed the pipe-line across the pampas right into the city. The great pride of hospitable and cheery Antofagasta is in the country club to which the visitor is always motored along the sweep of the bay; here is a cool building with a fine dancing floor and a good cook. But its chief claim to admiration is the little garden, no more than a few feet square, tended so devotedly that all the year round it glows with gay flowers.

All the chief towns of the nitrate pampas, besides possessing rail transport to the Pacific, are connected by the main line of the "Red Central Norte" to Santiago, and thence to the farming regions of the Chilean south; there is through railway connection, thus, between such towns as Iquique and Antofagasta and the newly-operating packing-house of Puerto Montt. Agricultural Chile has no better markets than those offered by the thronged and busy nitrate pampas and ports of her own north, and from Llanquihue to Coquimbo, the last outpost of farming country in northern Chile, foodstuffs are sent by rail or sea to supply the great region of desert camps.

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Antofagasta. The Nitrate Wharves.

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Copper

The future of copper mining in Chile is wrapped in uncertainty. The industry has already undergone a not unfamiliar transformation, with a deeply marked effect upon the Chilean population engaged in this work, for, commencing as a series of individual enterprises on the part of the native-born, it has become a large scientifically organised business operated chiefly by foreigners,[1] with the Chileans reduced to the position of wage-earners.

Under the old haphazard system, when a man would frequently go out into the desert alone, or with a single companion, hunting for rich veins of copper ore, a good living at least was the rule; when the discovery of a considerable deposit warranted the introduction of simple machinery, a few employés, transport animals, etc., many little and big fortunes were made. The buyers and smelters of last century also earned satisfactory returns. But, curiously enough, the huge organisations utilising immense masses of lower-grade ores, employing thousands of men and most modern machinery, with smelters at the mining camp, are generally stated to be run at a loss. There are reasons why such statements should be accepted with reserve, but looking at the matter purely from a Chilean angle it is at least questionable whether an industry which yields nothing to the national treasury in the way of export dues upon the mineral shipped out, and which draws many thousands of men from agricultural zones to an isolated and entirely artificial life under conditions tending to lower the standard of citizenship, has a sound *raison d'être*. Possession of the large Chilean

[1] The most recent foreign entry into the Chilean copper field is that of the Japanese, with interests in three large deposits in Bio-Bio Province.

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copper deposits, whether operated at all, or operated without profit, does however enable a group of powerful interests controlling copper in North America to control also the copper markets of the world: for after North America, Chile is the scene of the greatest identified copper areas, the two series of mines together producing over 60 per cent of the total international output.

At the present time, that is to say, at the end of 1921, the situation in Chile with respect to copper is briefly this: there still exists, throughout the copper-sown regions of Coquimbo and Atacama provinces, a diminishing number of small mines following rich veins of the ore. Some of these are little more than holes in the ground, others are worked by organised companies with good machinery, housing several hundred workers and owning their own system of transport, as the Dulcinea mine in Copiapó. But almost everywhere the rich lodes, containing anything from 8 per cent of copper upwards, are disappearing; they have been hunted for centuries, and although scientific examination of these immense regions would no doubt reveal many unsuspected rich deposits, the accessible mines have been worked out to a considerable degree.

No more striking example of the rise and fall of a copper mining centre is to be seen in Chile than at the deserted city of La Higuera. It lies just off the road leading from La Serena (Coquimbo) to the iron mountain of El Tofo, upon a tiny thread of a stream trickling from the steep and tumbled mountains. The city lies in the shallow cup of an immense hillside, a patch upon the sandy and orange waste; numbers of black dumps mark the sites of old copper mines, a score of chimneys stand among the silent machinery of abandoned mines. At least a thousand houses make, from a distance, a brave showing.

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But at the approach of the infrequent visitor in automobile or on horseback, the houses are seen to be windowless, empty; nothing moves in the sun but a stray cur or two, until presently an old woman with a child at her skirts peeps from a makeshift shelter. The whole place is dead; not an engine is working, not a gang of workers moves upon the great spread of properties. The exhaustion of rich veins, difficulty of competition with metal produced at less expense in a fallen market, coupled with tangled litigation, has brought back silence to this strange spot in the mineral-strewn mountain spurs that here crowd down almost to the sea.

The day of La Higuera is not long past; the mines of this extraordinarily rich region were actively productive during the present century. But a similar fate has already closed down very many smaller groups of mines, as it closed down smelters from Arauco to Antofagasta. In the prosperous days of the industry last century, when Chile was the greatest copper-producing country in the world, a big fleet of sailing ships, copper-bottomed, fast, with a famous list of captains, voyaged constantly between Swansea and the Chilean coast by way of Cape Horn, bringing British coal and merchandise and returning with bar copper or rich ores. A whole colony of Welsh set up the first scientific furnaces in Herradura Bay, just outside Coquimbo Town, and at a dozen points the little smelters of Copiapó and Coquimbo were busy; simple methods were used with profit, and many Chilean residents recall the time when the stem and stalk of the *cardon* were always used to obtain a fine clear fire when annealing copper.

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El Teniente and Chuquicamata

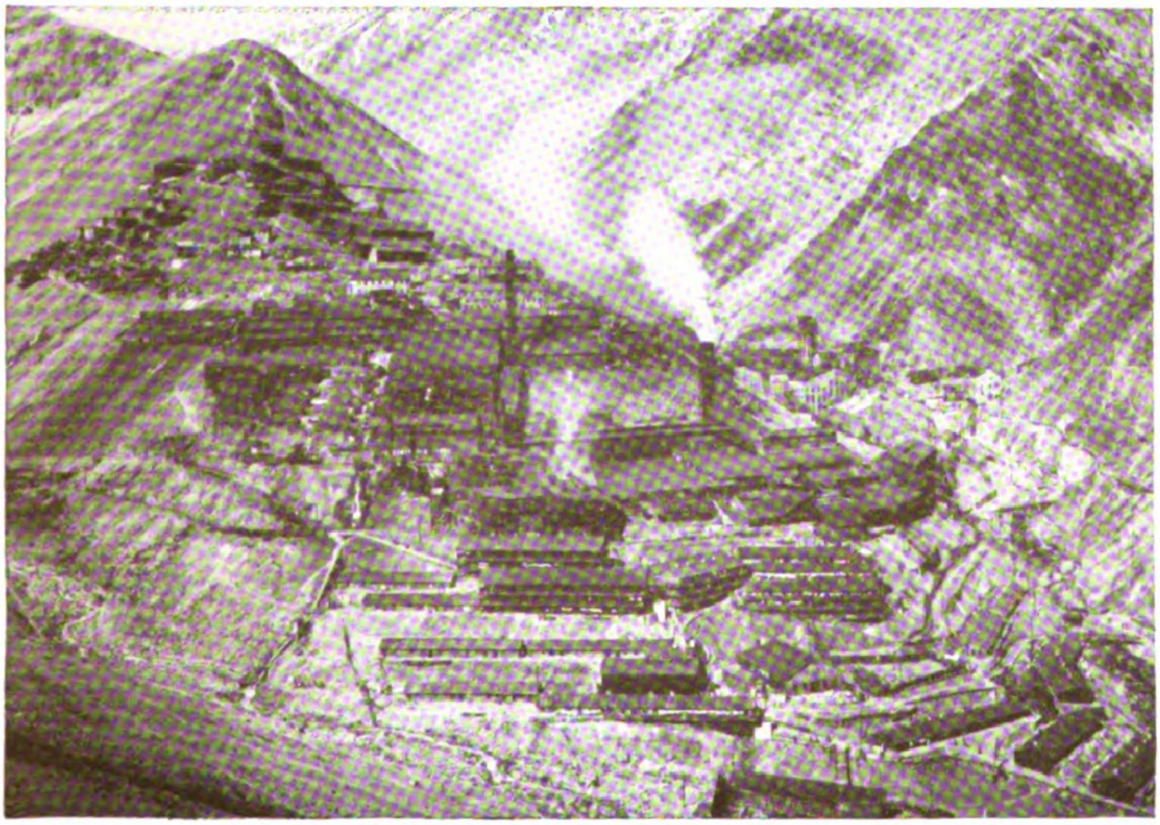
The most spectacular of the large copper mines in operation today in Chile is that of El Teniente, situated on the rim of an ancient crater of the Andes east of Rancagua, the nearest main line railway station. Sewell, the little town of mining employés, is connected with Rancagua by the private line of the Braden Copper Company, 72 kilometres in length, climbing from Rancagua's altitude of 513 metres, or about 1600 feet, to the mining camp's height above sea level of 2140 metres, or some 7000 feet, on the side of a terrific gorge in a tangle of rocky mountain shoulders and peaks. The main ore bodies lie above the site of the town and plant at altitudes ranging from 9000 to 11,000 feet, one peak, El Diablo, on the crater's edge, rising to 13,000 feet.

The amount of copper ore found in masses on the circular rim was calculated at the beginning of 1920 as 174,500,000 tons of 2.45 per cent, with (probably) 92,-000,000 tons of 1.91 per cent ore in sight, with, in all probability, other large deposits in the vicinity. The main body now under exploitation yields a low-grade ore containing an average of 2½ per cent of copper in the form of sulphides. The ore is brought down to the plant by a railway line protected by sheds from the deep snow falling and standing for six months of the year; is crushed very fine, treated by the oil flotation system about which so much litigation has raged, and smelted by three processes during which the copper is freed from sulphur and iron. A small quantity of gold and silver remains in the bars shipped to market. Crushing 5000 tons of ore per day, a production of 100 tons of bar copper is at present possible; plans are also under way for new mills at a snow-free site on the rail-

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Sewell Camp at Night.



Sewell (El Teniente Copper Mines) near Rancagua.

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way line to Rancagua, at a spot where the junction of the Coya and a canal from the Cachapoal River forms a waterfall of 422 feet, yielding hydraulic power sufficient for the generation of 40,000 H.P. A new power house recently completed, on the Pangal River, another near-by Andean torrent joining the Cachapoal and Coya, adds to the equipment by which the Braden Company contemplates 10,000 tons of daily crushing, operations which should result in the production of over 70,000 tons of bar copper each year. Paralysation of international markets has so far checked the materialisation of these plans, and during 1921 the plant was operated at no more than half its capacity. The most prosperous year which the mine has had so far was that of 1918, when El Teniente produced nearly 35,000 metric tons of bar copper, out of the Chilean total production of rather more than 102,200 tons: a year later, 1919, the Braden Company sold and shipped only 10,000 tons of bar copper.

Rancagua, a somnolent little town lying about 70 miles from the Pacific, has no direct rail communication with the sea, and derives what liveliness it possesses from its position upon the main line to Santiago, its chief market, and as the terminus of the Braden Company's electrically-operated line to El Teniente or rather to Sewell — which has an older name, Machalí. At times the activity resulting from the mine's access to this town, and this town alone, is regarded without any pleasure by the townsfolk, for when strike trouble occurs there is likely to be a descent of discontented workmen and families. Such an occasion occurred at the time of the disorders at the end of 1919, when an army of expelled men with their families walked down the narrow track from Sewell to Rancagua, and although the journey of 72 kilometres occupied some

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three days, and the spirit of the strikers was reduced by their experiences, Rancagua was alarmed and embarrassed by their presence.

A curious mixture of workers finds its way to this and other mining camps of Chile. The bulk consists of the hardy Chilean himself, concerning whose good qualities no employer of intelligence and feeling has any doubts: he is strong, trustworthy, kindly — but can be roused by drink or anger to violence. Treated well, he is the best element among massed groups of workers. But side by side with the genuine and sound Chilean is not only the malcontent roaming from north to south, from camp to camp, according to his own will or the exigencies of the Ley de Residencia, but the "hard case" from half a score of different countries. The mines are refuges for every variety of man who is down and out: they offer fertile ground for the sowing of Bolshevik propaganda or the seed of the I. W. W. of California, whose flag has been seen more than once flaunted in Chilean streets. The curious artificial life of the camps, with its poor rewards, the lack of healthy recreation, of the sight of the horizon, of birds and fields and flowers, of any interest at all but that of daily toil, lends itself to the development of grievances.

From Rancagua to Coya the line is open to the public, the pleasant and famous Baths of Cauquenes lying in the deep green gorge of the Cachapoal River followed by the track. Casual visitors to the camp at Sewell are however not encouraged: there is a wary eye kept upon possible purveyors of such forbidden joys as alcoholic liquors. El Teniente is as "dry" as managerial care can make it, but the fact that 1200 to 2000 bottles of whisky and brandy are seized every year by the camp detectives without putting any end to the attempts of the *guachucheros* (bootleggers) appears to prove that

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enough liquor gets through to make the business pay. Despite this lack of welcome to the unintroduced stranger, however, Sewell is hospitable to the visitor, and any accredited person receives pleasant courtesies.

The rail automobile which takes such visitors from Rancagua to the camp offers by far the most agreeable form of travel; the bright green fields and sub-tropical verdure of the sheltered plain country gives way to deep folds of mountain spurs, and presently, rising into colder air, vegetation is reduced to a few hardy shrubs and mosses, and the violet and tawny shoulders of the Andes rise from the banks of the racing river. When I visited El Teniente the mountains were bare; their rocky sides, steep, incredibly scored and peaked, took on at sunset and dawn brilliant hues of rose and flame; but before I left the first snow fell, transforming the whole country in a single night. A thick blanket filled the crevices of the sheer rocks, black ridges and points alone emerging; the piled tenements of the miners, clinging like birds' nests on the face of a cliff, were blanched, half-buried, pathless. Communication with the outer world, by the single line down the ravine to Rancagua, was actually not much more restricted, but with the blocking of even the few mountain tracks open in summertime the isolation of the camp was emphasised.

There are about 2800 miners engaged at El Teniente, but the total population of the camp, including the workmen's families, the officials (chiefly North Americans), employés of railways, stores, etc., is usually over 12,000. All this artificial town hangs precariously on a steep slope immediately opposite to the jagged crater where the huge copper deposits are embedded. Formerly, rows of camp buildings were built on the mine's lower slope, but avalanches of soil, rock and snow neces-

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sitated the removal of dwellings to the present site, at the 7000-foot level.

Scarcely a sign of mining operations is visible from across the mountain chasm, although work has been going on here for at least 200 years. Owing to the treacherous nature of the country rock and danger from snow slides during six months of each year, the ore bodies are now attacked from below; entrances to the intricate system of shafts and subterranean passages are lost in the rugged crenellations of the old volcano. Yet the place is honeycombed: one tunnel, starting from the more recently approached Fortuna side, runs all round the three-quarter-mile-wide crater; there are innumerable hoists, ore-passes, shafts, galleries and tunnels, that, with the railways and powerful machinery and gangs of workers, comprise an industrial town hidden in the mountains.

The second large copper property operated by the Guggenheim interests in Chile is at Chuquicamata, in the high deserts of the province of Antofagasta, at about 11,000 feet above sea level. The region has long been famous for its copper-ore deposits, and small, rich veins have been worked during and since colonial times.

Most of these high-grade ores have been exhausted near the surface, whatever may lie hidden in the heart of the region: the principle adopted by the Chile Copper Company, as that of the Braden, is to attack large bodies of low-grade ore upon a big scale and in a scientific manner. But "Chuqui" is an open-air mine situated on a tawny desert, in extraordinary contrast with El Teniente, and the actual processes employed are different because the two bodies of ores differ in composition.

Chuquicamata is reached by way of the Antofagasta and Bolivia Railway. An all-day ride from Antofagasta

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Sewell (El Teniente Mine) in the Snows of June.



Railway between Rancagua and El Teniente.

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Port takes the traveller across the flaming nitrate pampas, waterless, without a sign of green, winding upwards until the air is chill and the wind bleak. At sundown, when the station of Calama is approached, the altitude of nearly 8000 feet has been attained. In the distance the lights of the mining camp flicker at a higher level; Calama itself shows a brilliant flare of green, for here is the river Loa and a little modern town with fields and orchards superimposed upon very ancient remains. Gold, pottery, and textiles showing Inca influence have been found in the old cemeteries of Calama.

There is from Calama a small branch line of a few miles running to Punto de Rieles, and some use is made of this to ship merchandise, etc., to and from the Chuquicamata camp: but a private line is projected, and a number of company motor cars traverse the road across the saffron desert between the main line and the mines, ignoring Punto de Rieles as much as possible. That ramshackle village is, indeed, little more than an impudent hanger-on of the big works; practically every little frowsy shack is a saloon or a gambling-den, more than one of the most enterprising brothel-keepers being white ex-employés of the camp. Even were any serious attempt made to operate Chuquicamata as a "dry" camp, the existence of this terminus-village a mile away would counteract these efforts.

The great ore bodies of Chuquicamata lie in a range of low, pale-hued hills rising gently from the shelving, wind-swept, dust-strewn plain; the chief mass of ore is easily attacked by steam shovels placed upon four or five different levels cut along the face of the most accessible slope, a system of light railways carrying the blasted-out rock, often of the beautiful blue and green tints exhibited by copper sulphates, to the plant in a shallow saucer below. Here also are the residential

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quarters of this isolated camp, where there is neither vegetation nor water, and a dust-laden wind prevails over the cold, widespread territory, bordered only by the snow-crowned peaks of such Andean giants as S. Pedro and S. Pablo.

The Chuquicamata ores are, chiefly, basic sulphates of copper, yielding about 1.7 per cent of the mineral. The present plant has a crushing capacity of 15,000 tons per day, which amount should produce 200 tons of bar copper. As work goes on all day and every day, this production if sustained would produce in twelve months over 70,000 tons of electrolytic copper, a quantity which Chuquicamata has not yet recorded; the mine's best year so far was that of 1918, when a total of 101,134,000 pounds of electrolytic copper was produced, or about 45,000 tons. The leaching or lixiviation process is employed here: the ores, crushed fairly fine, are soaked in a solution of copper sulphate for 48 hours, during which period the copper in the introduced ore is drawn into the liquid. This, when chlorine has been extracted, is poured into vats through which strong electric currents are passed, causing the copper to be deposited in metallic form upon the copper sheets suspended therein. The sheets and the deposited metal are melted and cast into bars, the process producing a high-grade electrolytic copper bringing top market prices. Eight hundred million tons of low-grade ore are stated to be in sight at Chuquicamata, and a plant capable of turning out 600 tons of bar copper daily is talked of.

Power for operating the Chuquicamata mine, works and camp is derived from Tocopilla, 100 miles distant on the seacoast, where the company's plant is situated. Transmission lines follow the course of one of the nitrate railways from the port to El Toco, thence running out

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across the desert, where a highway also extends. Since no fuel exists in this northerly region, nor are there water-falls available, the plant uses petroleum imported from North America to generate the power required.

Chuquicamata employs about 2000 Chilean or Bolivian, with a small sprinkling of Peruvian, workers, housed under conditions which leave something to be desired. Many of the huts are made of sheetiron, with partitions dividing the rooms; the floors are of mud, and an opaque substitute for glass obscures the window space in too many cases. The better-class houses are insufficient for all the native-born workers, and it is not surprising that a degree of discontent has more than once been fomented in the camp. Daily wages run higher here than at El Teniente, averaging over nine Chilean pesos per day as against rather less than eight pesos, but this raised scale does not compensate for the greater cost of living and other disadvantages. Fuel is one of the serious difficulties; coal is almost unknown, and the employé's womenfolk are seen cooking over a charcoal brazier, or a fire made of an umbelliferous plant from the mountains (*llareta*), or a few pieces of wood brought from long distances. A great deal is said by the company of the Welfare Work Department: its most striking exemplification is in the big clubhouse which, well equipped and decorated, is however used almost exclusively by the North American officials and their families.

In addition to the two big mining plants at El Teniente and Chuquicamata, the Guggenheim interests in Chile include the old-established smelters at Carrizal and Caldera ports: the latter, in common with all the smelters founded during the last century, took only high-grade ores, the average of the mineral accepted here working out at about 10½ per cent of copper.

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These works turned out over 5000 tons of copper ingots in 1918, but were closed in 1921, following the slump in prices.

Chuquicamata is operated by the Chile Copper Company, a subsidiary of the Chile Exploration Company; El Teniente is operated by the Braden Copper Company, which is owned by the Kennecott Copper Corporation, one of the Guggenheim creations also controlling Alaskan and Utah copper properties. The Braden Copper Company is stated to have shown a deficit of $1,500,000, United States, in 1919.

Pudahuel and Potrerillos

Geographically speaking, there lie between El Teniente and Chuquicamata two other large copper deposits acquired by North American interests since the European War. Between Santiago and the sea lie the Pudahuel mines, identified at least a hundred years ago, worked for their rich surface veins, and now owned by the Andes Copper Company, a subsidiary of the Anaconda interests. Immense masses of low-grade ores, rivalling those of the Guggenheim interests in extent, are said to be available, but although in 1920 projects for a big plant were under active development, work was slackened by depressed markets and the operation of the deposits is not yet in sight.

A similar fate has befallen the widely heralded plans connected with another Anaconda property, a huge deposit of low-grade copper ores at Potrerillos, in the Andean spurs east of the railway junction at Pueblo Hundido in Atacama province. The main ore bodies lie in a ravine about 12,000 feet above sea level and consist chiefly of sulphides and oxides. At the time when I visited the region in late 1920 the treatment of

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these ores had not been decided upon, and no machinery installed, although an expensive housing scheme had been carried out at the mine. A railway between the tiny village of Pueblo Hundido, a handful of houses in the middle of an apricot-hued desert, and the high-placed mine were in operation; and a power plant, burning petroleum, had been set up at Barquito, on the coast a few miles south of Chañaral, the transmission lines running out across the sandy waste for some 130 miles.

Work on the Portrerillos installation was suspended about the middle of 1921, before a single ounce of copper had been produced. High above the copper deposits are extensive beds of sulphur, and upon the extraction of this mineral, needed in certain processes employed in treating low-grade ores, a certain amount of work has been done.

There are 16,000 mines of copper registered in Chile, covering an area of 57,000 hectares upon which the mining tax of ten pesos per hectare is paid. Of the producing establishments, Chuquicamata and El Teniente are by far the greatest, exporting in 1918 nearly eighty per cent of Chile's total production. From the Caldera smelters was shipped a total of 5217 metric tons; Catemu produced 3790 tons; Gatico, 3708 tons; Naltagua, a French property, 3653 tons. Small quantities came also from El Volcán, El Hueso, and the Chañaral smelters, also in French hands. For the last ten years Chile's output of copper in comparison with the total world supply has varied between 4 per cent in 1911 and 1912, and 8 per cent in 1918. By far the greatest producer of copper today is the United States, with a highest record of 880,000 metric tons in 1916, followed by Japan, shipping her highest recorded figure in 1917, when 124,000 tons was produced; Mexico,

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75,000 tons; Canada, averaging 50,000 tons; and Peru, 45,000.

Iron

The story of Chile's iron deposits and works offers one of the most curious chapters in her mining history.

The most important of the identified deposits lie in the desert country north of Coquimbo, the fields at El Algarrobo and Algarrobito in the Department of Vallenar, Atacama Province, having interested a German firm some years before the war. No practical results were achieved, although the region recorded a small export of manganese, from the Astillas beds, until economic conditions checked these shipments soon after the beginning of this century. Proximity of quantities of manganese ore to the iron fields, reported as being of immense extent, has raised repeated hopes for the foundation of a great industry, but the crux of the problem is the absence of adequate fuel or water supplies, and the unproductivity of a sterile territory.

The only works so far established in connection with Chilean iron ores depend upon what is the most remarkable ferruginous deposit on the West Coast, paralleled only by the Itabira peaks in Brazil and the iron mountain of Durango in Mexico. El Tofo, some forty miles north of Coquimbo town, and fifteen miles from the Pacific, is a round hill practically composed of hematite ores running over 65 per cent pure, the quantity in sight totalling at least 300,000,000 tons. The hill stands among an imposing array of rolling mountains, and both dwellings and mine workings are daily enshrouded in seas of white mist.

Early in the present century this huge deposit was acquired by a French company, the Société Altos Hornos de Corral, which mined a quantity of the ores and

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transported them by light railway to the little bay of Cruz Grande and thence to the south where, at the port of Corral in Valdivia province, a smelter was erected, the first experimental production of pig-iron taking place in 1910.

The company was fortunate in obtaining from the Chilean Government various privileges, including the concession of 58,000 hectares, or about 145,000 acres, of southern forest land, estimated to be capable of yielding 50,000,000 cubic metres of fuel wood. The Prudhomme process is employed at Corral; wood fuel alone is required, and an important item in the calculated income from the operation of the plant is that of the sale of by-products (charcoal and alcohol) obtained from the wood, in addition to the output of the blast furnaces. The plant was built to produce 50,000 tons of pig-iron annually, and would require for this purpose nearly half a million cubic metres of fuel wood; the expectations of the company have, however, not been realised, and when I saw the plant in 1920 it had been inactive for several years. A week of trial under the auspices of Chilean Government engineers headed by Dr. Manuel Prieto was undertaken in July of the same year, and an optimistic report issued: a few noteworthy points are quoted below.

With regard to the cost of production, the report states that the iron ore costs at Cruz Grande nearly ten pesos per ton (the peso in mid-1920 being worth about one shilling): but the sea freight, unloading at Corral, and transport to the smelter cost 14 pesos per ton. Despite the high freight charge, the cost of producing the 345 experimental tons worked out to only 152 pesos per ton, a quantity of the company's ingots finding a sale at 345 pesos per ton. If the calculation is correct that, working sustainedly, the smelter could produce

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pig-iron at all-in costs of about 55 pesos per ton, the only problem is that of finding sufficient local or other South American markets prepared to take yearly 50,000 tons.

To obtain this quantity, the engineers estimate the employment of 70,000 tons of iron ores, purchased from El Tofo at 8.40 pesos per ton. The famous iron hill is no longer operated by the French Company, for during the war the deposits were leased to the Bethlehem Steel Iron Mines Company, and an extensive establishment created. A contract exists by which the Bethlehem interests guarantee to supply a maximum of 100,000 tons of ore free on board at Cruz Grande to the Société Altos Hornos, for thirty years.

If the fate, so far, of the Prudhomme smelter at Corral is misty despite high promise, that of the big installation at El Tofo is no less clouded. As soon as the Bethlehem Company took possession, large sums of money were spent on an entirely new installation. Land was acquired at Cruz Grande, an oil-burning power plant set up, the railway line rebuilt and electrified, and a loading basin for the Company's special ore-carrying steamers, each of 17,000 tons capacity, cut out of the solid rock. The basin is 500 feet long by 40 feet wide, and on the dock side are 17 chutes each with a storage space for 20,000 tons of ore, operating electrically, and built to discharge their contents into 17 hatches so that each ship would be loaded in four hours' time.

At El Tofo itself electric shovels attack the face of the hill on four or five levels; the crushing machinery is, like the ore-carrying outfit, the most modern that Bethlehem's experience has evolved; strings of dwellings for workmen and officials stand upon the spur leading to

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the iron hillside. The Company's intention, I was informed by the sole official left in the silent camp, is to ship the rich ores of El Tofo to Sparrows Point, Maryland, where special equipment has been built to unload the Cuban ores imported by the Bethlehem interests. The haul from Chile is however considerably longer than from Cuba, and although transit by way of the Panama Canal has brought the Atlantic Coast of North America into closer commercial touch with the West Coast of South America, the cost of freight or other equally powerful reasons have prevented materialisation of the original plans. In more than one instance, wealthy firms making immense sums of money during the great war appear to have placed capital in investments far afield from which a return was not desired for reasons having a certain relation to the tax collector; and whether or no these considerations had any bearing upon the acquisition of large copper, iron, tin and silver deposits in various parts of South America by powerful companies, the fact remains that vast mineral resources have been added to the properties of a comparatively small group, and that their active operation may in the future affect international markets.

Early in 1921 announcement was made to the effect that a concession for thirty years of 140,000 hectares of forestal land in Llanquihue Province had been granted to a German firm, for the installation of large iron works. At the same time the concessionaires, who were stated to be engineers representing the Krupp firm, secured an option upon the Pleito iron ore deposits in Coquimbo and another series of mines in Atacama known as the Zapallo fields. Several Chilean newspapers, including the energetic *Mercurio*, took excep-

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tion to the land grant, pointing out the possibility that Germany was evading the spirit of the Treaty of Versailles, prohibiting her from manufacturing arms or guns within her own territory, by setting up big iron and steel factories upon foreign soil; it was also objected that the territory conceded includes a considerable part of the forestal reserves left in South Chile. A strip of woodland two kilometres wide had been reserved by the Chilean Government between the concession and Lake Todos los Santos, and with this exception the German grant extended from the lake to the foot of Calbuco volcano, with water outlet to the Pacific by way of an arm of the Gulf of Reloncaví. The Petrohue River is said to offer power for large hydraulic installations, and two other and smaller streams also run through the grant.

Ore from the north would, according to the plan, be transported to wood-burning smelters in the south. But difficulties arising from the claims of property-owners in the conceded tract of forest appear to have checked the scheme; the concessionaires announced their withdrawal in early 1922.

The attitude of the Chilean Government is, quite naturally, that it is desirable for large industrial development work to be promoted: and that the concession of forestal land given to the German interests would have been gladly granted to other nationals making similar propositions.

Gold and Silver

In early colonial days there was a fair yield of gold from Chile, chiefly obtained from the sands of the southerly rivers and deposits, as those of Tiltil, situated in the mountains between Valparaiso and Santiago,

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and the shining sands of the river beds of Huasco. It is estimated that from the days of the first settlement to the end of the fifteenth century Chile produced 131,000,000 pesos' worth of gold, 63,000,000 worth in the sixteenth century and 167,000,000 in the seventeenth.[1] After Independence and the encouragement of foreign enterprise, production rose in less than fifty years (1801 to 1850) to 226,000,000 pesos (all these calculations being reduced to pesos of eighteen pence for purposes of comparison), but weakened abruptly when the deposits of alluvial gold, eagerly sought and worked, became exhausted by the end of the century. The present yearly production of gold averages about 2,000,000 pesos, chiefly from the Alhué mines near Rancagua.

The present production of silver is also a shadow of its former record. Once upon a time rich silver mines were worked at Uspallata, near the Pass; these were already abandoned in 1820, when Peter Schmidtmeyer made his journey. Chile never rivalled Potosí, where travellers of the early sixteenth century (before the amalgam process was introduced in 1571) might see 6000 furnaces shining together at night upon the famous hill; but her mines recorded a splendid total in one quarter-century, 1876 to 1900, when 432,000,000 pesos' worth of silver was produced. Lowered inter-

[1] Betagh, writing of conditions in 1720, says that there were gold mines at Copiapó, "just beyond the town and all about the country likewise, which have brought many purchasers and workmen thither, to the great damage of the Indians; for the Spanish magistrates take away not only their lands but their horses, which they sell to the new proprietors, under pretence of serving the king and improving the settlements." He also noted the saltpetre, lying "an inch thick on the ground" in the north, and says that the country is full of all sorts of mines. About the year 1709 two lumps of gold found near the Chilean frontier, one of which weighed 32 pounds, was brought by the Viceroy of Peru, Count Monclove, and given to the King of Spain. In another washing place near Valparaiso belonging to priests gold nuggets are found, he says, ranging from a few ounces to one and a half pounds in weight.

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national prices and the exhaustion of rich veins so reduced the industry that in 1915 only 1,000,000 pesos' worth was produced, and although later years have reached values of over 3,000,000 pesos, future great production depends upon new discoveries and scientific operation. The mining engineer still has much work to do in the deep folds of the Chilean Andes, while the sands of the islands south of the Strait of Magellan have yielded, and are likely to yield again under good management, rich harvests of gold.

Coal

The coal industry of South Chile owes its greatest impetus to the energy of Matias Cousiño, organised development dating from 1852; but mining for commercial purposes began as far back as 1840, when a field near Talcahuano began to supply the needs of Chile's first steamship line, forerunner of the present Pacific Steam Navigation Company.

The entire region of Chile from Concepción southwards to the Territory of Magellanes is dowered with coal deposits, but the richest region is a series of mines strewn for one hundred miles along the coasts of the provinces of Concepción and Arauco. Wealth in coal has brought a large number of factories and mills to the prosperous city of Concepción, was a factor in the establishment of the chief naval station of Chile in the fine bay of Talcahuano — the best-sheltered port of Chile — and developed smelting and metal-refining works at Tomé, to the north of Talcahuano, and in Coronel and Lota, farther south.

Many coal beds known to exist in the Chilean south are unworked as yet owing to lack of transport in undeveloped regions, but in addition to the big mines in

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operation in the rich regions of Arauco and Concepción, a deposit is being worked near Valdivia (the Sociedad Carbonifera de Máfil) while the Loreto beds are also under exploitation in Magellanes Territory, near Punta Arenas. The product of some of the Chilean mines is of excellent quality, but the product was, before the war, insufficient in quantity and not of a grade rendering it suitable for all railway and steamship uses. It was therefore supplemented by hard steam coal imported from foreign countries; before the outbreak of war in 1914 British mines were shipping about 1,000,000 tons per year to Chile, Australia sent about 450,000 tons, and the United States sent small quantities that varied between 3000 and 100,000 tons. The supply from Welsh and Australian mines was, during the war, diminished almost to vanishing point, and at the same time imports from North America rose to three or four hundred thousand tons, and the Chilean home production was immensely stimulated.

Chile's producing mines are fourteen in number, twelve of these lying in the Arauco region; in 1909 production amounted to less than 900,000 tons, but had risen to over 1,500,000 in 1918 and 1919. Eleven to twelve thousand men were then employed, as against 9000 in 1911. The most important operators are the Compañia de Lota, Coronel y Arauco, a combination owning four mines and tributary railways, employing 3670 workers, and producing more than half a million tons of coal yearly. Next comes the Cia. Carbonifera y de Fundición Schwager, also situated at Coronel, employing 2800 men and producing over 400,000 tons; the only other company with an output of over 200,000 tons annually is that of Cia. Carbonifera Los Rios de Curanilahue, employing 1500 men. Both here and in the Lota mines the plant is operated by hydro-electric

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power, and throughout the Chilean fields the standard of machinery and equipment is high. The general width of coal seams operated in Chile is from fifty to sixty inches.

The wages paid are about the same as for other mining and industrial work in Chile, ranging from five to seven pesos (paper) per day. The Coronel mines, many of which are deep-seated and run under the sea, pay at a higher rate, averaging eight and a half pesos, but the Loreto mine in Punta Arenas, where workers are scarce, pays its employés nearly twelve pesos a day.

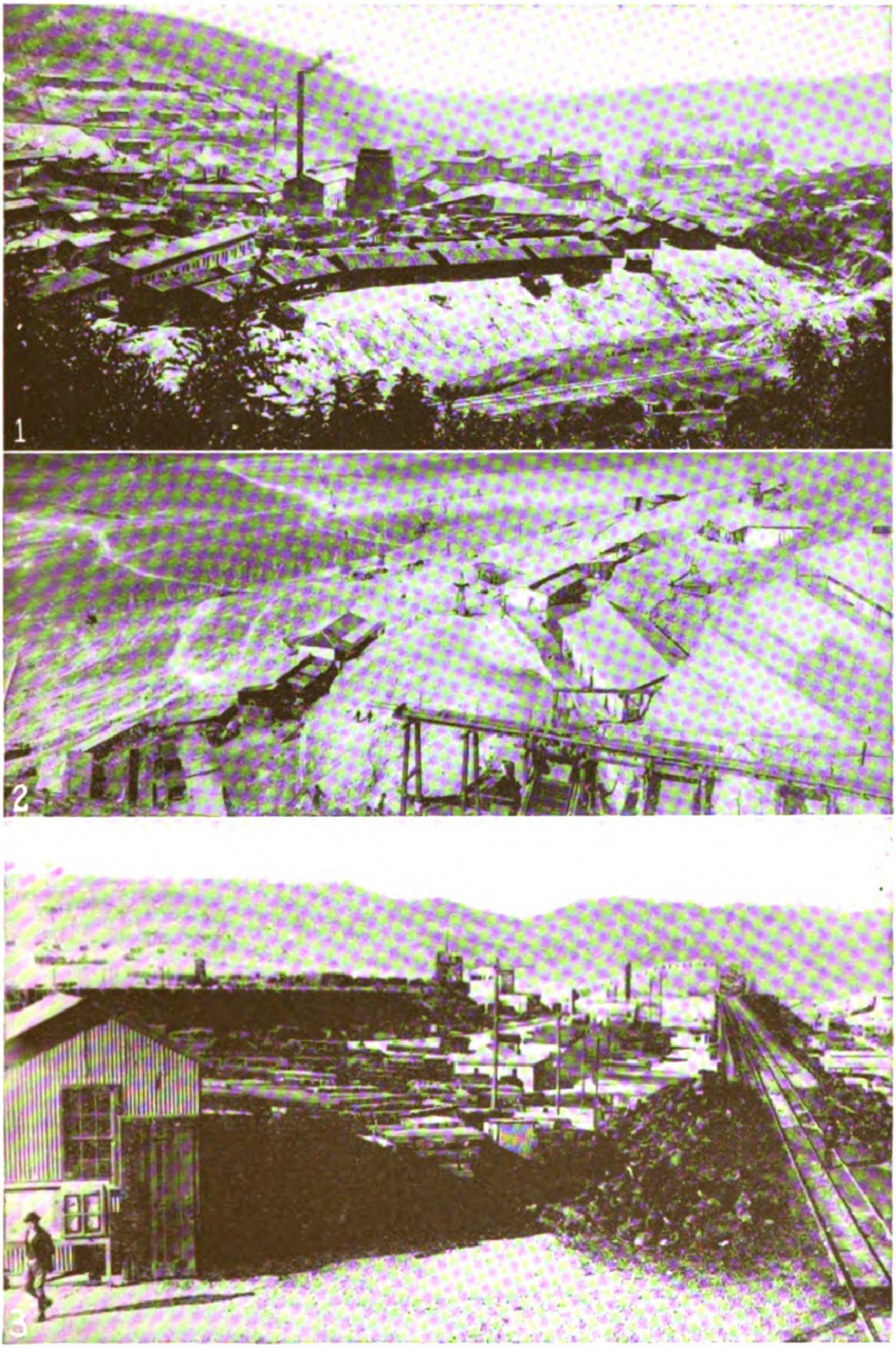
Chilean coal miners work only 280 days in the year, but conditions are not always acceptable and there have been from time to time serious strikes; the last, occurring at the beginning of 1922, was said to be mainly fomented by the considerable foreign element.

Among the remaining coal companies of importance are the Cia. Carbonifera de Lirquen (Penco); the Cia. El Rosal (Concepción); and the Cia. Carbonifera de Lebu, owning three mines and a railway.

The price of Chilean coal responded to war conditions. In 1914 it stood at about 13 paper pesos per ton; in 1915 it rose to 25 pesos, and thence steadily climbed to 57 pesos in 1917, to 70 in the following year, and to 85 pesos in 1919. With the cessation of hostilities these prices, which were comparable with those of foreign imported coal, dropped; at the same time demand fell, fewer vessels requiring bunkering, not only because older fuel depôts became again available but because the extended use of the Panama Canal by international vessels is making itself felt more keenly. South Chile found its ports recording many fewer foreign vessels in 1919 and 1920 than in former years.

In the Lonquimay region, along the valley of the

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Curanilahue Coal Mine, Arauco Province.
Dulcinea Copper Mine, Copiapó Province.
Chuquicamata Copper Mine, Antofagasta Province.

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upper Bio-Bio, are deposits of petroliferous shales, upon which a big industry will some day be founded. The most hopeful reports suggest the presence of a great oil-bed, but it is undisputed that the superficial layers or *capas* yield 5 to 6 per cent of petroleum, the lower part of the bed yielding 12 per cent. In Scotland a percentage of 5 per cent is considered good enough, and the development of the prosperous North British industry could no doubt be duplicated in Chile — with adequate transport facilities. Manifestations of petroleum have been also identified farther south. Don Salustio Valdes, an enthusiastic Chilean mining engineer, considers that the most promising deposits are in the Province of Llanquihue, at Carelmapu, where the Cia. Petroléos del Pacifico has acquired territory; in Magellanes Territory, near Punta Arenas, where the Sindicato de Petroléo de Agua Fresca is operating; and on Tierra del Fuego, upon the north shore of Useless Bay. Natural gas escapes in considerable quantities in all these regions.

Borax is produced by a British company from a wonderful and beautiful lake-like deposit at Ascotan, on the Antofagasta and Bolivia Railway almost at the Bolivian frontier. Nearly half the world's supply comes from Ascotan, the pre-war export of Borax Consolidated averaging 40,000 tons, a quantity subsequently reduced owing to the imposition of a heavy export tax and high freight rates. The deposit lies at an altitude of over 12,400 feet with temperature ranging from 24 degrees below zero (Centigrade) and 32 degrees above, so that this well-organised company works under climatic difficulties accentuated by high winds, rain and snow.

Sulphur is abundant in Chilean mountains from north to south, a few thousand tons being annually

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produced, chiefly for the use of the copper mines; lead, cobalt, nickel, aluminium, graphite and bismuth also exist in the highly mineralised north; deposits of manganese are worked on a small scale near Merceditas in the interior of the Province of Atacama.

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CHAPTER VIII

AGRICULTURE

Area under Cultivation. — Oases in the Desert. — Farming in Central Chile. — Vineyards. —Wheatfields, Orchards and Sheep Farms. — Irrigation Canals.

"AGRICULTURE in Chile and Buenos Aires has formed their population, while the mines of Peru have extinguished almost all the Empire of the Incas." So wrote David Barry in his preface to the *Noticias Secretas* in 1826.

I think that no one who knows Chile today will dispute the suggestion that her fertile soil has chiefly contributed to her social well-being. It has brought white European settlers, able to rear families in a magnificent temperate climate; it has offered permanent homes and not a temporary field for the fortune-hunter. There is a spring of life about the farming region of Chile, a sense of energy, health and freshness that is extraordinarily exhilarating. Much of this land is still but newly opened: one may pass through hundreds of miles of land where the tree-stumps of the primeval forest still stand among the vigorous corn, where the farmhouse is but an impermanent thatched hut. But the dark rich earth, the lusty crops, the blossoming orchards and hedges, the green pastures with their sleek cattle, create a scene of genuine content. The holdings may be new, yet they are plainly homes. Chile possesses mines, but they drain rather than create populations; growing industries — weaving factories,

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grain mills, and a score of new employments which tend to concentrate wealth and culture; but it is in her farming lands that the truest cradle of the race, the frankest and strongest people, the most cheerful spirit, is found.

In actual figures the amount of land under cultivation in Chile is not immense, yet the farmlands produce not only sufficient grain and fruits to serve the needs of the inhabitants of both fertile and arid regions but also ship a surplus to the exterior markets of Peru, Ecuador and Bolivia.

Government statistics add up the total of land assigned to "agricultural properties" or farms to 18,000,000 hectares, or about 45,000,000 acres. But not all this land is under cultivation. The area devoted to cereals, beans and peas, potatoes and vegetables, is reckoned as about 4½ per cent of all Chilean territory, or 750,000 hectares, equal to two and a half times as many acres; vines and orchards, 111,000 hectares; planted woodland, 32,000 hectares. The cultivated pastures (grass, alfalfa, clover, etc.) attain the figure of about 520,000 hectares; while there are nearly 7,000,000 hectares of natural pastures. Twenty-two per cent of all national territory is ascribed to forest and woodland, much of it either utilisable for industry or at least covering the ground with a rich vegetable detritus of great future value to the farmer. Twenty-nine per cent of Chilean land areas is regarded as completely sterile, or at least negligible under present conditions.

This proportion of uncultivated or barren country appears high at first sight, but three great areas must be practically excluded from possible cultivation, although unlikely and long-neglected regions have of late triumphantly proved their worth as sheep pastures.

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The great, diversified and topographically fantastic Territory of Magellanes, comprising 71,000 square miles, has little to offer to the agriculturist.

Sheltered country as that in the vicinity of Punta Arenas produces certain field crops, while the limit of cultivable land both in Eastern Patagonia and upon the islands of Tierra del Fuego, Navarin, Brunswick, and other smaller groups, has not been reached with the establishment of sheep farms; but the barren and rocky lands on the borders of many channels, where blue glaciers creep to the edge of the water, and that part of the Strait region where the freezing gusts of the "williwaws" bend the heads of the drenched forests, is outside consideration until the climate changes.

Also beyond the vision of the farmer are the widespread, sun-scorched and waterless districts of the three northerly provinces of Atacama, Antofagasta and Tarapacá, covering more than 95,000 square miles of land: as well as most of the 9000 square miles of Tacna, whose final ownership is still undetermined. The third considerable region which is apparently destined to remain uncultivable is that of the rugged and broken foothills and heights of the Andean slopes of eastern Chile, where nothing lives but wild mountain birds and the hardy guanaco.

Reckoning in hectares, Magellanes counts an area of 3,214,000 hectares, or about 8,000,000 acres: yet only 133 hectares were under crops in 1919. At the same time the Island of Chiloé, with a surface of about 8600 square miles, had only 75 hectares in cultivation. As between the too-dry lands of the north and the too-rainy country of the south, agricultural advantages lie with the former, for wherever irrigation is possible the natural disabilities are at once overcome, and the rainless belt becomes magnificently fertile. The agricul-

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turist of the Chilean lands below Puerto Montt is seldom able to risk planting a cereal crop, for even should the heavy rains not affect the fields adversely, the grain must be gathered green lest wind-storms should blow the ripened seed away. However, the discovery of the last few years that certain types of sheep (usually cross-bred Romney Marsh varieties similar to those reared in the Falklands) thrive in Chilean Patagonia, Tierra del Fuego and other once-despised Magellanic lands, has brought about an agreeable transformation in the agricultural industries, as in the revenue and population of the far south.

Oases in the Desert

Perhaps it is partly because they stand out in such sharp contrast with a barren background that such northern valleys as that of the Lluta, with pretty Arica town at its mouth, appear to be of such enchanting loveliness. In other regions, burning ochre deserts stretch away in dazzling sunlight, and suddenly one comes upon the tender lime-green fields of the Copiapó River; the emerald maize and alfalfa of the Loa; the Pica Vale, a strip of deepest green studded with millions of the golden globes of ripe oranges; or the exquisite Elqui and Huasco in the month when loads upon loads of grapes, peaches and figs are ripe. In every dip of the land where a stream flows down from the Andes, gardens and orchards bloom; careful intensive cultivation is the rule in north Chile, where the farming industry, has received an impetus since the nitrate fields swarmed with industrial camps, ready to pay big prices for every pound of fresh fruit or vegetables.

This cultivation of orchards in the desert is reviving enthusiastically, but is no more than the restoration of

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ancient arts; before the day of Spanish occupation irrigation was extensively practised, and we know from the large burial grounds discovered near what are today small villages that certain parts of the arid country formerly supported considerable populations — as at Calama, at Chiu-Chiu, or at Arica itself. The desolation of former cultivated districts is sometimes ascribed to the war-expeditions of the Incas, sometimes to the destruction of irrigation works by the Spaniards, sometimes to the action of earthquakes which have diverted rivers from their original courses, and is certainly to be atributed in many cases to the character of the streams, rushing from mountain heights with tremendous force, washing away fields and defences, and leaving wide, stony and sterile beds to mark their ruinous course.

Tacna province, with Arica as the port and Tacna City as the capital, is looked upon hopefully today as a source of supply of sugar and cotton for Chilean mills; both these commodities are now imported. With sufficient water, this little province of 40,000 inhabitants can produce also enough tobacco for Chile's internal consumption. The Sociedad Industrial Azucarera de Tacna, formed at the end of 1920, hopes to plant 8000 hectares in sugarcane, to obtain from the harvest of each hectare ten tons of sugar, and thus to fill the Chilean demand for 80,000 tons of sugar per year. Apart from this enterprise, whose results are awaited with interest, a number of small landholders already produce a little sugar, and find a ready sale for the almonds, olives, walnuts, peaches, figs, green fodder and vegetables cultivated. The splendid cotton of Tacna province is eagerly purchased by South Chile's mills, but the export is small as yet, amounting only to a few hundred tons annually; there is every induce-

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ment to immense extension of the cultivation of this fibre, and when present plans to canalise the waters of the Caplina River and of Lake Chuncara are completed, the little province will multiply its 230,000 hectares now under cultivation.

Tarapacá Province is curiously situated as regards cultivation; to the north a few rivers reach the sea, as in Arica, but from Pisagua southwards the great nitrate beds lie like an immense dry lake parallel with the coast, and a dozen little rivers flowing down from Andean foothills disappear in the desert sands long before they reach the eastern edge of the nitrate pampas. But each one of these rivers is a green ribbon of fertility, and Tarapacá ships its luscious oranges to the nitrate camps, and by train all the way to Pueblo Hundido in Atacama.

Antofagasta's one considerable river is the Loa, subject to strong floods, but irrigating small fields all the way. There are but 121 farmers in the whole province of 46,000 square miles, cultivating less than 3000 hectares. Sites of old pre-Spanish towns along the Loa's banks are proof of centuries of utilisation of its waters.

Copiapó possesses two charming oases in the desert. The first and most important is the ancient town of Copiapó, long famous for its copper mines, but depressed by the drop in metal prices after the close of the European war. The second is Vallenar, whose bright setting of little fields, peach trees and vines, is a joy to the eyes after a journey through the copper country. Neither region produces enough foodstuffs for its own maintenance, and there is no agricultural surplus to sell. The whole province of over 30,000 square miles has less than 20,000 hectares under irrigation.

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Coquimbo Province is generally regarded as the northern limit to general farming; it is a small province, including only 13,500 square miles, shouldered by the Andes that here push down within eighty kilometres of the Pacific Ocean, but it is prosperous and enterprising. The population is about 250,000, of whom 4500 are farmers; of the remainder the great bulk are interested in mining small veins of copper, an industry which has been handed down for generations as a kind of technical inheritance in northern Chile. I know a Coquimbo farm, excellently managed, situated a few miles outside Coquimbo Port and its older sister, La Serena, which is a revelation of what can be done under the difficulties attendant upon almost constant drought — for the rainfall does not usually attain two inches in the year — and a temperature which remains steadily at about 60° Fahrenheit. The livestock were, in the period of greatest heat, driven eastwards to the hills, many landowners upon the coast following the system of buying supplementary land in the cordilleras in the hope of finding at every season a few patches of pasture. John McAuliffe is one of those Britons who identify their fortunes with those of Chile, and forty years' residence, with experience of ship-building, mining and farming, has made the genial owner of San Martin a resourceful producer and distributor.

Coquimbo Province possesses 1,500,000 hectares of land devoted to agriculture, of which 20,000 are irrigated and about 25,000 are "artificial" pastures. Vineyards on a commercial scale, orchards of figs and other sub-tropical fruits, as well as fields of wheat, maize and barley, produce a surplus exported from Coquimbo.

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Farming in Central Chile

South of this province Central Chile begins. Aconcagua, Valparaiso, Santiago, O'Higgins, Colchagua and Curicó are among the most delightful regions in the world, with a perfect climate, fertile land, access to markets, and employés who are not yet impressed with the views of the I. W. W. which have troubled the waters of Chilean industry so effectively during recent years. It has been the writer's good fortune to see something of the life upon several estates devoted to general farming and livestock, upon fruit and alfalfa farms, and upon one of the finest vine-growing and wine-making properties in Central Chile. I cannot imagine a more agreeable life than that upon these estates.

In the first example, the lands are situated upon the Aconcagua River, extending from this barrier in a half circle enclosed by a horse-shoe of wooded hills. The river is a typical Chilean watercourse, widespread, turbulent, spreading into five or six branches on a wide and stony bed. When the snows melt and the stream comes down with great force, it is almost impassable, although the sturdy Chilean horse, extremely intelligent and well trained, will always struggle across safely so long as the reins are left loose. The farm includes about 250 acres of irrigated land and about 2000 acres of hillside. The jealously-watched water rights are regulated by a set of special laws, and as there is just about enough water for the service of the farms along the Aconcagua's banks, with none to spare, water-stealing is a black crime. Quebrada Redonda is a mixed farm, upon which a couple of hundred sheep, as well as cattle and horses, are fed: the fields are brilliant with lucerne, wheat, beans, barley and Indian corn. In the kitchen garden are peaches, walnuts, artichokes,

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oranges, pears, plums, celery — in fact, all fruit and vegetables that grow in temperate or sub-tropical zones. The lawn edges are gay with roses and iris, chrysanthemums and lupins. All the flat lands are fertile: no fertilisers are needed, but leguminous crops are grown in rotation with cereals. The milk of the Chilean cows is first-class in quality and produces cheese — made daily by the simplest process — that finds a ready sale in local markets.

The hill lands, invaluable upon a Chilean farm, offer plenty of food for the young cattle in winter. Within a few days after the first heavy rains the brown slopes turn green, and the cattle are driven up to crop the new carpet of young grass. The woodland yields sufficient timber to supply the domestic needs of the *patrón* and the *inquilinos* (farm hands working upon a special system), but there is no growth of big trees. The graceful, evergreen quillay is the base of quite a considerable industry, for the bark is highly saponaceous, and, stripped and dried, is sold in all the public markets in Chile. The maiten, another thick little tree, is also cut for firewood; the litre offers useful lumber when of sufficient size. Down by the water stand rows of familiar willows, their branches draped with the scarlet flowers of the parasite quintral; and on the slopes are scores of bunches of blue-green dagger-shaped leaves enclosing a stalk crowned with a violet flower-head. This is the chagual, whose young stem is eaten in springtime, a lovely period when pink wild lilies clothe the rocky slopes and a myriad flowering trees and shrubs scent the clear air. Many of the aromatic leaves and barks for which Chile is famous are used to make medicinal decoctions, beloved of the working classes.

Adjoining this property is another fine farm, also operated by an energetic country-loving Briton; here

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lemons and other citrus fruits are grown in well-kept orchards and the fields are given over to alfalfa and hemp, grown in rotation with root crops. Chile has no warmer advocates of her attractions than the owners of Quebrada Redonda and its neighbour, but both farmers lay stress upon the need for personal attention to every detail and constant residence upon the property, even with the best *mayor-domo* performing the duties of a farm bailiff or estate steward. It is also emphasised that Chilean lands are not for the worker without capital. In this coveted region, in fact, costs run high, as the following data, owed to Mr. Geoffrey Bushell, demonstrate.

The average cost of good irrigated land, near the railway, in the Central Valley (from Aconcagua to the Maule) is about 4000 paper pesos per *cuadra* of some four acres: or say £50 per acre with exchange at twelve pence to the peso. To this should be added £50 per cuadra for the purchase of horses, cattle and implements, and another £50 per cuadra should also be allowed for fencing, drains, repairing or putting up buildings, expenses frequently renewed even when a farm is in good running order. Land in less accessible regions is less costly, but transport in Chile depends upon railroads, since the highways are out of action in the rainy season, and it is worth while to avoid trouble by a greater initial outlay. No farm is cheap if its products cannot be sent to market.

When the estate is in good running condition, returns come quickly and markets are excellent; a profit of 12 to 15 per cent upon invested capital is usually expected, but may rise to 20 per cent. Alfalfa can be cut at least three times a year, and always finds a ready sale: potatoes, wheat and barley, beans, hemp, aji (red pepper), all do well and are good selling crops. Potatoes, for

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example, yield 300 bags (of 100 kilos each) to the cuadra, and bring fifteen to twenty pesos per bag in the Valparaiso markets.

Animals can be kept out of doors all the year round, and the stock-fattening and dairy businesses are both good. Fruit cultivation, apart from such good carriers as lemons or oranges, is not recommended, since quick access to markets is lacking and selling organisations do not exist.

In order to buy, stock, equip and operate a farm and to wait a year for returns without inconvenience, a farmer taking up land in Central Chile should have £15,000 ($75,000 U. S. currency). He needs at least fifty cuadras, or 200 acres, of irrigated land, as well as some wild bush, preferably hill country. Workers are never abundant in South America, but the *inquilino* system retained in Chile tends to keep generation after generation upon the soil, and no good farmer lacks help in spite of the higher wages offered by the mining industry. Attacks have been levelled against the inquilino system, yet it works well in practice when estate-owners are just and a personal interest taken in the worker's welfare. The men live upon the estate with their families, are given a cottage rent free, a strip of land of generally one or two acres, and sometimes the use of ploughs and other farm implements; a horse and a few domestic animals are usually owned. One pound of bread and one pound of beans are given daily, cooked if so preferred, and one peso per day in cash. On the farms visited by the writer the houses of the farm hands were sound and clean, and the families appeared cheerful and content; I heard warm praises of the Chilean worker from employers.

The life of a farmer in Chile, it was generally agreed, is pleasant; constant attention is required, but rewards

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are sufficient and the delightful climate compensates for many difficulties. The open-air life, constant horseback riding, and the sense of freedom in a country not too densely populated, attract many Europeans, lamenting nothing more than the absence of certain forms of sport. There is fair fishing, for instance, in the fast streams from the Cordillera, but there are no sporting fish; no hunting, but good shooting in wooded or open country. The partridge and tortolita fly well and fast, and give almost as good sport as grouse; snipe and quail are also to be found in the central regions.

Vineyards

In this same region of the Aconcagua Valley are some of the best vineyards and wine-making estates in Chile. The great Panquehue property, one of the Errazuriz estates, is a magnificent sight with its endless rows of trained vines bearing white and black grapes, stretching across the rich brown lowlands to the foot of the Andean spurs, where all cultivation ceases, and where valuable peat has been identified in vast stretches. Here are 2000 acres devoted to viniculture, and from the fruit of the low-trimmed branches is produced each year 2,000,000 to 3,000,000 litres of wine, chicha and brandy. Chilean red and white wines are of sound and pleasant quality, superior to the Mendoza brands, owing to greater suavity; some of the native-made "Sauternes" are practically indistinguishable from the French original. It is astonishing to realise the simplicity of this ancient industry of wine-making, for although Panquehue has today a machine crusher, and a mechanical press, an automatic bottler, etc., there is something primitive and ample in the process. The *bodegas* (cellar warehouses) of the estate are immense vistas of cool stillness,

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the huge vats looming high in the semi-darkness beneath a succession of great arches. This estate, with its enormous and luxurious house of the owners, its settled population of workers, its self-supporting crops and fine livestock, has almost a feudal atmosphere. Altogether, Chile has 90,000 hectares, or say 225,000 acres, under grape culture, about ten times as much as California in her pre-prohibition days.

While these vineyards of the central provinces are in very fine condition — extending west from Santiago to within sight of the sea on the beautiful slopes towards Valparaiso — the real heart of the grape country is farther south, where also lie the great food-producing regions of Chile. The great grape country is spread over Curicó, Talca, Maule, Linares, Ñuble and Concepción provinces, while the wonderful valley of Lontué is one great vineyard, with over 10,000 acres under cultivation. Estates follow in a long succession, some able to boast of model villages for workers and thoroughly up-to-date methods of wine-making. The product of Lontué is sold not only throughout Chile, but is shipped to Argentina, Peru and Colombia. "Dry" laws in Chile, advocated by Dr. Fernando Peña, do not seem likely to cause the extinction of viniculture here, if only for the reason that the use of wine is scarcely ever excessive among the native workmen, or in the educated classes. The industry is extremely important to Chile, is chiefly in the hands of Chileans-born, and represents a very large investment; these considerations would not, however, preserve the vineyards ultimately if the effect of their existence were pernicious. The facts appear to be against any idea of this kind.

South Americans in general inherit the temperate habits of the Latin, and when strong liquors cause

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trouble amongst such closely crowded groups of workers as one finds in the northern mines, badly made spirits and not wine are to be blamed. Against the disembarcation of imported spirits the workers of the north rose in arms, in 1920, procedure echoed in Punta Arenas a little later, and an investigator sent to the spot by the *Mercurio* of Santiago reported that for every pint of good southern wine sold in Taltal, there were twenty pints of noxious alcohol — much of it made on the spot in amateur stills.

Wheatfields, Orchards, and Sheepfarms

Cereal culture, whether of maize, wheat, barley or other grains, exists throughout Chile, but from Coquimbo to Chiloé are the great fields of *trigo blanco* and *trigo candeal* — the latter, hard wheat, grown chiefly upon 20,000 acres in the north of the Central Valley, and the former upon 1,000,000 acres, chiefly in the provinces of Maule, Linares, Ñuble, Concepción, Bio-Bio, Malleco, Cautin, Valdivia and Llanquihue. The total wheat crop is 5,500,000 metric quintales, worth 16,000,000 pesos. It is in the great fertile region of the south that one finds the largest number of small farmers, for most of this agricultural country has been opened during the last fifty or sixty years, and no great ancient estates exist. Valdivia and Llanquihue were developed mainly by the efforts of settlers from Central Europe in the middle of last century, while old Araucania was not finally opened to white settlers, whether foreigners or Chileans, until the punitive expedition of 1881 broke down the frontier for ever. Land was parcelled out in comparatively small estates, and as a result Chile is fortunate in counting about 97,000 land proprietors; of these, 65,000 owners farm less than 50

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acres each; 25,000 others farm holdings of less than 500 acres; 5000 estates are between 500 and 2500 acres in extent; and only 465 proprietors are possessed of estates totalling over 12,000 acres.

To create these southerly farm lands great forestal areas have been necessarily denuded, and a good deal of work is required to keep down the luxurious growth of creepers, wild bamboos, ferns and undergrowth. But the southern agriculturist is spared the constant preoccupation of the northerner as regards water supply. Chile has little marsh or swamp country today, although the presence of large peat beds is eloquent of ancient bogs, but the south is very well watered. Too well watered, in fact, in some localities, Valdivia's 115 inches of annual rainfall being well outdistanced by Chiléo's 134 inches; the genial softness of the climate saves these localities from the unusual unpleasant effects of such heavy rainfalls, for if it is almost true that in Valdivia it rains every day, it is also true that the sun shines every day.

Between the Maule River and Lake Llanquihue the whole country of Chile is like familiar ground to the traveller from well-tended countries of Western Europe, an impression specially keen in Chile's autumn, March and April. Orderly apple and cherry orchards stand bordered by hedges hung thick with ripening blackberries; long level fields show the tender green of clover. Beside the rose-clustered farmhouse are neatly built stacks of wheat straw; in the meadows are fine sleek cattle and well-groomed horses. The fenced garden is full of flowers, of vegetables and herbs, and behind the house is a grove of walnuts and chestnuts. The farmer riding along a muddy road has the ruddy cheeks of the temperate zone, and the only strange note is

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struck by his poncho and long jingling spurs. Rows of tall poplars, burned golden, edge the fields. As background to this ordered fertility there rise to the east the shining, silver-white heads of volcanos — Llaima, Villarica, or Antuco, or, farther south, Osorno and Calbuco — and from the lines of dark forest there run deep and silent rivers. The south is remarkable in possessing three navigable rivers, the Tolten, Imperial, and Valdivia; the Bueno is also traversed by small steamers in part of its course from Lake Ranco and is a channel for farm produce.

Wheat is harvested in the south at the end of March, but in May apples and pears are still being gathered and nuts are ripe. The big crops of strawberries, plums, and cherries are sent to jam and conserving factories, South Chile supplying the whole of the West Coast with canned fruit, while the export of fresh fruit to New York and London is a new industry with bright prospects.

South of Temuco the land is seen in three stages. Belts of primeval forests close down to the border of railway track or road, a green wall matted with the wild climbing bamboo, the trails of scarlet and purple fuchsias, or the slender vines of copihue with its beautiful rosy bells. Native beech and lingue, their feet deep in ferns, stand as a solid barrier, feathering at the top into thickly leaved branches; the wild witch-hazel's sweetly scented, creamy flowers break from every thicket.

That is the first stage: the next is encountered where a settler has recently broken ground, and corn springs between the blackened stumps of burned trees. A log hut, thatched, windowless, stands at the side of the clearing. In the third stage all signs of violence are gone; the forest is conquered, the cleared space smoothed and ploughed, the homestead enclosed with

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a neat wooden fence. Rows of young fruit trees display slim twigs beside the farmhouse, and this already has its chicken-run, dove-cote, stable and pleasant meadow for horses and cattle. A chain of sawmills is seen in this lately redeemed country with its thick reserve of forest lands.

Between Valdivia and Puerto Montt lies a great potato-raising country; the land flattens out from Osorno to the edge of Llanquihue Lake, and here hundreds of well-managed farms flourish; a large proportion of the settlers possess German names, and their forebears brought with them, seventy years ago, the craft of the farmer. Today the population is Chilean. Farther south, upon the island of Chiloé, another group of foreign origin operates farms beside the native Chilotes: after the South African War ending in 1903 a number of Boers came here and, in spite of the marked difference between climate and conditions of the Transvaal and South Chile, remained and prosper.

Chile feeds about 5,000,000 sheep, of which number 2,000,000 have been raised in the far south, in the Territory of Magellanes; 2,250,000 head of cattle are distributed throughout the country — Tarapacá and Antofagasta owning about 600 head between them, while Tacna has 2500 — but by far the largest number, 2,000,000, are grouped in the provinces below Valparaiso. The country supports also about 400,000 horses, 55,000 mules, and 300,000 pigs. The wool clip of Chile averages 170,000 metric quintals, four-fifths of the total coming from the Territory of Magellanes.

Among the small farming industries of Chile are bee-keeping and flax-production; a little olive oil is made in the more northerly provinces, and the dried raisins, peaches and apricots of Huasco have earned much more than local fame.

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The rise of sheep-farming and allied industries in Magellanes Territory is one of the great surprises of the century. Punta Arenas itself, founded on paper by President Bulnes in 1843, and tentatively settled in 1851, was for a long time nothing but a penal settlement: but a rising of the convicts drew attention to the region, the discovery of gold reefs and coal beds, as well as petroliferous shales, brought a number of enterprising people, and by 1897 the first flock of sheep, brought by the governor Dublé Almeida twenty years previously, had multiplied so fast that the territory counted 800,000 as the total flock. It was difficult to find a use for the sheep, and by way of solving this problem the first packing-house was established in 1905 at Rio Seco, about ten miles from Punta Arenas.

Four *frigorificos* are now in operation, at San Gregorio Bay, at Puerto Bories (Ultima Esperanza) and at Tres Puentes, in addition to the first established. During the war the packing-houses exported meat products (frozen and conserved meat, fats, etc.) worth £1,000,000 sterling annually, and large fortunes were also made by the sheep-raising farms when the price of wool soared from sixpence per pound to twenty-two pence. The largest of the companies running sheep on a big scale is the Sociedad Explotadora de la Tierra del Fuego, which started operations in 1893, has a capital of £1,800,000, raised in London, and owns over a million sheep.

A fifth packing-house built at the close of the war and already in operation is situated in Puerto Montt, is British-financed and equipped, and aims at helping the situation of this part of the south, possessing a surplus for northern markets but lacking sufficient transportation for live animals.

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Irrigation Canals

Irrigation canals have been in use in Chile for hundreds of years, those constructed by private estate owners watering a total of over 3,000,000 acres. Several of these are ambitious constructions, those diverted from such well-supplied rivers as the Maipo and Aconcagua extending in certain instances for over one hundred miles.

The great O'Higgins built a canal ensuring Santiago's water supply 150 years ago: a continuance of this wise policy of Government direction in a matter of national importance has been advised by many thinkers in Chile, but it was not until the closure of nitrate enterprises in 1914 forced the Government to find employment for surplus workers that irrigation laws were added to the Chilean code and bonds issued to finance the construction of four important canals. In early 1915 the creation of a new section in the Public Works Department inaugurated a period of great activity in the work suggested, and by the beginning of 1921 the Manco Canal drawing water from the Aconcagua was already completed, its forty-five miles of main length bringing water to nearly 8000 acres of land. The cost of construction was 2,000,000 pesos paper.

At the same time work was begun on the Maule Canal, drawing water from the Maule River; it is 115 miles long, irrigates 113,000 acres, and was built at a cost of 8,500,000 pesos; its completion represents an engineering feat upon which Chilean engineers are to be congratulated. A fall created by one of the branches of this canal offers 20,000 h.p. to users of hydraulic force in Chile.

The Laja Canal diverts water from the river of this

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name, has a main length of 25 miles with distribution canals of 240 miles, and is lined with concrete for ten miles of its course where sandy soil is traversed. It is calculated that this canal serves 110,000 acres of land. The Melado Canal, drawing water from the river of the same name, is fifteen miles long, and irrigates 75,000 acres.

The Public Works Department also plans construction of canals drawing water from the Culenar River, to irrigate 12,000 acres; from the Nilahue, to irrigate 25,000 acres; and from the Colina, to irrigate 10,000 acres, while businesslike schemes for damming and utilising the water of seven of Chile's string of snow-fed mountain lakes in the south are also under way. All this work is due for completion by 1925, while studies of the strange rivers of the north that flow from the Andes and bury themselves in the sandy deserts long before the sea is approached have also been energetically carried on, with a view to salving these much-needed waters. Don Carlos Hoerning, Chief Engineer of the Chilean Reclamation service, says that the wonderful northern climate and soil respond to irrigation by producing crops five times as abundant as the normal rate in the south, justifying the expense of pumping and piping water.

Formerly, private enterprise was interested in irrigation canals only in the central farming regions, while the more generously watered south ignored the question; but denudation of the southern forests has brought about a change in this rainy region while the need for foodstuffs and the excellent rewards awaiting the farmer have valorised every acre of good soil, and today a large proportion of the canalisation projects of the Government refer to southerly regions. With little public land to offer, the Chilean Government's

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new laws were drafted to reach the owner of large areas of uncultivated — and, if without water, uncultivable — land. When the newly inaugurated system is in full working order Chile should have at least 100,000,000 acres under the plough.

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CHAPTER IX

FOREST AND WOODLAND

Extent. — Beech, Conifer and Bamboo. — Trees in Northern and Central Chile. — Plantations.

CHILE'S heavily wooded country lies in the rainy south, and stretches from the stormy islands about Cape Horn through the long archipelagos and the provinces of Llanquihue and Valdivia, the forests gradually thinning out as they run northward through the old Araucanian country. The province of Cautín is the last stronghold of deep forest.

Altogether, the tree-covered area of Chile is estimated at 15,000,000 hectares, or about 37,000,000 acres; but at least two-thirds of this quantity must be left out of consideration as regards opportunity for organized commercial effort such as paper-pulp making. Lack of large "social" woods, and thin or patchy distribution, is of course a bar to industrial effort on a great scale, but there are immense stretches existing in certain regions, as in Valdivia, with nearly 2,000,000 acres of continuous forest; Llanquihue, with 1,500,000 acres; and Chiloé, with rather more than 1,000,000 acres.

An impressive picture is created by the density and extent of the southern forests of Chile, among the last of the great primeval tree-covered areas in the world. They are like immense green seas, filling mile after mile of basin-like valleys, running up the sides of the lower Andean spurs, and in the archipelagos often closing down to the sea's edge so thickly that waves break be-

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tween the trunks. Up to the present the trees which have proved most useful are conifers, as the alerce, used for centuries by the native Indians for their canoes; the "Chilean pine" (*Araucaria chilensis*), yielding a big cone-full of kernels not unlike chestnuts, which must not be confounded with its kin, *Araucaria imbricata*, the "Monkey-puzzle" tree; the tall lumo of Chilóe, used for shipbuilding, and exported to Liverpool before the war; and two varieties of the native "roble," which are not oaks, as this colloquial Spanish name suggests, but varieties of beech.

The evergreen beech (*Fagus antarticus*) flourishes in Magellanic territory, and with its kin the deciduous *Fagus betuloides* and the cypress (*Libocedrus Tetragonus*) stands along the borders of Magellan Strait and on the glacier country of the deeply scored waterways extending northwards; its habitat does not extend north beyond the Chonos Islands, or about 45° of south latitude. All about Punta Arenas this beech is of great service, is used for house construction and boat-building, and still exists in large stretches of woodland. The famous Winter's Bark (*Drimys Winterii*), a beautiful tree whose aromatic-scented bark was noted by the earliest travellers, is also used locally. Many of the shouldering green heights that edge the Strait are clothed almost to the summit with trees that, changing to burning yellow and orange tints by the month of April, glow from the mists, their lower trunks thick with ferns.

Two wild bamboos of South Chile are common — the small climbing "quila," and the "colihue," sometimes growing thirty feet tall, and congregated in great social tracts known as "colihuales." Characteristic woodland of the Valdivia region is tangled with these bamboos, with thick ferns, and with such creepers as

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the lovely *Lapageria rosea*, with its waxen pink or white flowers that retain the Indian name of copihue — the national flower of Chile, and the no less beautiful Philesia.

The handsome conifer called alerce (*Fitzroya Patagonica* Hook) grows in extensive woods or "alerzales" in the Llanquihue region, its base deep in ferns, the thickly-berried berberis (*Empetrum rubrum*) and other fruit-bearing shrubs, as the *Myrtus nummularia*. From these berries the native Indians made their fermented drink "chicha" in the time before Spanish soldiers and missionaries brought European fruit-trees to South Chile; today apples are chiefly used for the same purpose.

The alerce frequently grows to a great size. Dr. M. R. Espinosa, visiting the regions of its greatest occurrence in 1917, measured conifers of this variety which reached 115 feet in height, with a trunk diameter, at three feet from the ground, of four and a half feet. Another big specimen measured twenty-seven feet in circumference, and he speaks of yet another giant, whose old trunk was still to be seen between Puerto Varas and Puerto Montt, with a girth at the base of over forty-two feet. The alerce grows perfectly erect, providing splendid planks of such uniform quality that up to comparatively recent times these "tablas" were the recognised standard of barter in the Llanquihue and Chiloé regions, and were exchanged like cash for imported manufactures and foodstuffs. The wood is red in hue, resists exposure to water and air, and is easily worked, light and resilient.

The coihue, another fine timber tree of the south, growing in "colonies," runs the alerce a good second in height, the two bearing the reputation of being the tallest trees found in Chile; the laurel, the lumo, and

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the canelo are not equally social in habit, but grow in mixed woodland and are therefore not commercially available to a like extent. The latter tree, the "Chilean cinnamon," has a scented bark and is sacred to the Araucanians, whose main festivals and ceremonies were traditionally held under the shade of the canelo's branches.

Forty per cent of the whole territory of Magellanes is estimated as forest: Llanquihue, Valdivia and Cautín possess a smaller proportion, for much magnificent woodland has already yielded to the axe of the settler, but there is still in all about 20,000,000 acres of timbered land south of the Bio-Bio River. Beyond Araucania the thick forest of the south gives place to light woods, with no large trees and none that are tall except the imported poplar, commonly known as the "alamo." All about Concepción the thickly-leaved little boldo is seen, yielding only small timber but much prized for the medicinal value of its leaves, from which "boldaina" is extracted; the thickets are full of the slim avellano, producing a nut closely resembling the hazel.

The wooded areas of the central region, especially in the well-watered parts of Aconcagua, O'Higgins, Valparaiso and Colchagua, are well supplied with lingue, maitén, litre and quillay. The bark of the latter is highly saponaceous and is sold in every Chilean market, but few of these trees yield planks large enough for construction purposes, and are chiefly useful as fuel.

The northerly, more arid country above Illapel frequently shows nothing but a thorny scrub of the mimosa family; one of these, the algarroba, is prized as a shade tree and for the green pods it produces, an excellent cattle food. When brown and dry, these pods yield a tannin used in curing skins, almost identical

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with the divi-divi of Venezuela. Beyond Coquimbo even the thorny scrub and cactus disappear, and in the Andean heights of Tacna the only fuel that offers is that strange growth, like a mammoth fungus, the llareta, that must be dried for over a year before it will burn.

It is thus plain that North and Central Chile, where is the bulk of the population of the country, cannot supply their own needs for lumber; it is from the great southerly habitat of the alerce, the coihue and the Chilean pine that vast quantities of wood for industrial and domestic use must be sought. Sawmills begin to dot the side of the railroad soon after the Bio-Bio is crossed on a southerly journey, and immense piles of fine planks and logs stand beside the line all the way to Puerto Montt. Immense tracts of forest are still untouched for lack of adequate transport, although the conformation of Chile, and the large number of southerly rivers and lakes, help to render the problem soluble. Even without any great organisation, the south supplies lumber to the central and northern provinces while filling its own requirements and exporting a varying quantity. It is difficult to estimate the amount of Chilean timber exported, since statistics of the number of pieces, or even of "bundles" of planks, are alone available; the value, in 1919, of unworked timber exported from the country is officially given as 1,496,000 pesos of eighteen pence.

Forestal laws in Chile have been slow in application chiefly because for centuries a great deal more woodland existed than could be utilised; land was needed for cultivation, and it was no crime to burn large tracts in order that farms should be created. I have heard it maintained in Chile that such forest destruction or at least the clearing of wide strips through the heart

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of certain southerly areas has been beneficial to the climate: that the Valdivia and Llanquihue region have been less lavishly endowed with rain and rendered more agreeable for settlers in consequence.

A few enterprising land owners have begun to replant woodland, growing plantations of spruce and eucalyptus for preference; for Chile is a hospitable host to all plants and trees brought from temperate zones.

A great deal has been said concerning the suitability of the South Chilean forests for making paper pulp, but up to the middle of 1921 no manufacture has been commenced. Expert opinion has proposed new plantations of eucalyptus, etc., owing to the non-social character of Chilean timberlands. Were the Chilean conifers more closely grouped the problem might have been solved long ago. Suggestions for utilising extensive thickets of bamboo, the colihue, have also been without result up to the present, but the recent careful investigations of a Swedish firm will, it is hoped, bear fruit. The south has plenty of water-power and easy access to sea or rail, two important points to be considered in connection with manufacturing industries.

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CHAPTER X

COMMERCE

Home Factories.—Chilean Market Needs.—Sales to Foreign Countries.—Foreign Firms in Chile.—Trade-marks.

THE position of commerce in Chile is better understood when it is realised that the country has no tropical products for sale. Apart from the extreme north, where rills of precious water redeem the preponderant desert, and where varying quantities of cotton, sugar and peppers are grown, farming is on a par with the farming of western or south-western Europe, or the temperate regions of Mexico. Chile has a surplus of wheat, cattle and sheep; a large production of grapes and wine; and, in the mineral field, offers her unique supplies of nitrate as well as about 6 per cent of the world's supply of copper. Timber from her southerly forests is chiefly used at home for house and ship building; Chilean coal finds its market in the Chilean factory regions or bunkering ports. Whatever the country has to spare of her cereals, fruit (fresh or canned) and other farm produce finds a ready sale in Peru and Bolivia; the copper is practically all ear-marked for the United States. Thus Chile's offering to the world outside the Americas is not large aside from her immense and greatly needed output of nitrate of soda.

The establishment of four packing-houses (*frigorificos*) in Magellanic territory, with another recently constructed at Puerto Montt, follows and encourages

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the big development of the sheep-raising industry, with a view not only to supplying the non-pastoral north, but selling a surplus abroad. The wool produced, and formerly exported, is likely to be entirely absorbed by home weaving factories, to which an important addition has been recently made at Valparaiso.

Of great help in Chilean industrial development is the Sociedad de Fomento Fabril, and the work of three Government industrial schools, at Santiago, Chillan and Temuco, turning out electricians, chemists, blacksmiths, carpenters and other technically trained students.

A country with a temperate climate, hardy population, possessing plenty of fuel and offering securities to foreign capitalists and business firms, is likely to prove an inviting ground for the creation of factories; certain parts of Chile, in consequence, are developing home industries in a manner comparable to that of South Brazil.

A good start had been made before the European War, but as in many other South American regions the pressure of necessity brought about a remarkable and speedy industrial growth. Deprived of big quantities of manufactured goods, Chile increased or built national mills, and can today produce a remarkably long list of the goods she needs. Home utilization of raw materials of course tends to limit Chile's export lists and, diminishing her income from overseas, narrows her capacity for purchases in foreign countries, rendering her still more dependent upon nitrate exports for national revenues.

Chile's beds of good coal, with the addition of immense forestal areas offering lumber, and, also in the south, considerable water-power resources, form a sound basis for manufacturing. Below the river Aconcagua factories are thickly dotted, and south of the

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Maule is a 600-mile stretch of country where new industrial towns lie like beads on a string, following the railroad track. Altogether, the large and small factories of Chile number twenty-seven hundred, counting every industry from Tacna to the Straits of Magellan; the group of important establishments employs 70,000 people, of whom 40,000 are men, over 17,000 are women, and over 5000 are children less than fourteen years old. Another 8000 people are employed by little industries. The value of the merchandise produced by these factories increased by nearly 50 per cent between 1915 and 1919, the latter year registering the manufacture of goods worth more than 765,000,000 pesos, Chilean paper. At an exchange value of twelve pence, this is equal to over £38,000,000. Santiago province topped the list with manufactured produce worth 280,000,000 pesos, Valparaiso following with 163,000,000 and Concepción coming third with 68,000,000 pesos.

Included in this output are metal goods, furniture, dried and tinned fruit: wines, beer, mineral waters, butter and cheese, lard, candles, soap, boots and shoes, wheat flour, Quaker oats, woven woollen and cotton cloths, pottery, chemicals, brown paper, bottles and other glass utensils, sugar and tobacco. Factories manipulating the two last-named commodities do not draw supplies of raw materials from Chilean soil but depend upon importations, chiefly from Peru. There are two sugar works, both Chilean-owned and operated; one is situated at Valparaiso and another at Penco (near Concepción City), where soft brown crystallised sugar is brought in sacks, and, after undergoing a series of new processes, including bleaching, is distributed to local firms in the form of soft white or cube sugar. The Chilean market rejects all sugars presenting any hue but that of pure white, I was informed when en-

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At Constitución, South of Santiago.
San Cristobal Hill and Parque Forestal, Santiago.
Malleco Bridge, near Collipulli.

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quiring at Penco why at least a proportion of the excellent brown sugar imported could not be distributed in that condition, and at considerably lower cost to the consumer. When the refinery was erected it was hoped that it could be exclusively supplied with raw material from local sugar-beet farms, and the failure as yet to produce these crops in quantity is emphasised by the retail price of sugar in Chile — fifteen pence per pound in 1920.

Also near Concepción, a few miles eastward following the curving banks of the silver Bio Bio River, is a British-owned and operated cotton-cloth factory turning out an average of 1,000,000 yards yearly, and working 276 looms. The machinery is British and yarns are imported from Manchester. All through the agricultural south are flour mills, of which half a score are owned by British firms; some of these installations are small and antiquated, but sixteen or more are equipped with the best modern machinery. As a result of this milling activity, Chile imports but little wheat flour, and this chiefly from Argentina to serve as a blend, her home mills practically supplying the whole of the country and leaving a surplus for export amounting to nearly 24,000 metric tons annually. The best customers for Chilean wheat flour are Bolivia (17,000 tons), Peru and Ecuador.

Concepción with its coal mines is fortunately placed for industrial development, and this with other similarly endowed regions and well-wooded and watered parts of the populated south are fast building up a list of manufacturing enterprises, most of them based upon local products. They are rapidly meeting home demands. The foreign visitor in Santiago has frequently received a surprise when permitted to see the extremely efficient Government munitions and instrument works,

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realising that here is a South American state which is able to manufacture almost all the equipment needed for its army, from cartridges and rifles to saddles and field-glasses, the lenses of the latter being the only part imported.

When such a visitor has also seen tobacco and shoe factories, and the soap, candle and soda works of the Lever firm at Valparaiso (supplying, with the sister factory at Concepción, one-third of Chile's needs for these goods), he will receive another lesson at the model match factory at Talca, where the well-being of workers is exceptionally well studied and a crêche for the children of women workers is maintained. He should make a point of visiting, at the rich agricultural centre of Traiguen, a factory where beautiful furniture is made, and, following a sight of the sugar, flour, candle works of Concepción, and fruit-canning establishments at Chillan, he will see at Valdivia the most ambitious ship-building yards in Chile, turning out vessels of over 3000 tons. Here is also an interesting factory making tannin from the bark of lingue, a large boot and shoe factory, a cider works and several breweries and fruit-preserving factories. Sawmills line the railway between Temuco and Valdivia, and thence to Puerto Montt, where the new frigorifico has been established, and an old lumbering commerce connects with the town of Castro, on Chiloé, where boats are built. Below Chiloé there is no industry until the extreme south is reached, and here in the vicinity of the Strait of Magellan are four packing-houses serving the West Patagonian sheep farms; at Punta Arenas are sawmills, and the headquarters of a number of gold-mining companies operating the alluvial deposits of the southerly islands, a brewery, candle factory, foundry and shipyard. Dawson Island possesses another ship-

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building industry, constructing wooden vessels up to 500 tons' burden. A series of scientific chicken farms also flourishes at Punta Arenas; 30,000 hens at Leña Dura yield an average of 200 eggs each, annually: the farm collects 5000 eggs per day, exporting them as far as Montevideo.

An immense impulse will be given to Chile's manufacturing industry when the hydro-electric developments planned during the last few years, and organised in 1921 by the Compañia Chilena de Electricidad, are completed. The creation of this new company is the work of S. Pearson & Son, Ltd., famous for brilliant water-harnessing and engineering in many other regions of Latin America. The Pearson firm initiated its interest in Chile by the purchase of the Santiago tramways which had been in German hands prior to the war, and were later operated by J. G. White & Co., on behalf of the British Government.

Pearson's decided to increase the power at the disposition of the local service, obtained solely from falls at La Florida, a few miles from Santiago, and effected a combination with Chileans of enterprise and engineering ability already holding concessions for big new hydro-electric development, including the Cia. General de Electricidad and the Cia. Nacional de Fuerza Electrica. Work upon the latter's plans was under way at Maitenes, inaugurated by the enthusiasm and skill of Don Juan Tonkin. The Pearson company decided to form a new organisation with capital sufficient to enlarge the scope of the work and to take over, in addition, other hydro-electric plans upon the Maipo and Colorado rivers. Proof of faith in Chile's future was given when Pearson's decided to domicile the new company in Santiago and to add to its assets the properties of the Chilean Electric Tramway and Light Com-

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pany, as well as prestige and financial backing. The new company is the Cia. Chilena de Electricidad, capitalised at £8,250,000, with a debenture issue authorised up to £5,000,000; Chilean capital is interested to the extent of nearly three-quarters of a million pounds sterling.

Under the enlarged project, the Maitenes plant will be increased to develop 34,000 h.p.; the increase of an existing steam-plant in Santiago will bring another 27,000 h.p. into the market; and the development of plans for the harnessing of the Maipo and its tributary the Volcán at Puente del Cristo means the creation of a large hydro-electric station, capable of producing 65,000 h.p. When these installations are in working order, Central Chile will possess a force of 140,000 h.p. at the disposition of public services, domestic utilities and industry; the horizon thus opened is equal to that of the biggest manufacturing region of South America, S. Paulo in Brazil, where in the city alone about 30,000 h.p. is used to turn the wheels of industry.

The electrification of many Chilean railroads follows as a matter of course: no sooner was the new company formed than the Chilean Government signed a contract for the supply of electric power for the State line connecting Santiago and Valparaiso, and obtained a loan in New York for electric locomotive and other equipment; similar improvement is planned to Los Andes and for the reorganised Transandine line. Transmission lines, bringing power to Santiago from the generating plants, will carry force to Valparaiso by way of Llai-llai and Quillota, with substations at important points such as Tiltil, whence the big cement works of El Melon at Calera will obtain electric power, while Valparaiso's industries will share in the new impetus.

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Chilean Market Needs

Chile's market needs are on a par with those of other South American countries so far as manufactured metals, especially machinery, mining and railroad equipment are concerned: in common with her sister states, she is also a buyer of such luxuries as fine textiles of wool, silk, and linen, perfumery and other toilet specialties, fine wines and spirits; also many utilities which she cannot produce, as print and writing papers, highgrade glass and ceramic ware, inks, paints and varnishes, cement, and sheet glass.

The best grades of cotton cloth are also imported, for the existing Chilean factories are limited in class of output; there is a considerable import of ready-made clothes, and of fine footwear, although it is but fair to add that Chile produces the best shoes made in South America and that her daintiest satin and kid footwear for women compare well with the output of the great makers overseas; Chilean red and white wines also outclass the vintages of sister states, but while the wealthy resident has plenty of money in his pocket there will always be a certain import of European champagnes and liqueurs, spirits and high-class wines.

Chile's purchasing power varies a good deal, fluctuating with the fortunes of nitrate. The value of imports during the last few years has swung from 153,000,000 pesos in 1915 to the high-water mark of 436,000,000 in 1918, after which a decline was experienced to 401,000,000 in 1919 and 350,000,000 in 1920. Certain commodities, with coal as the striking example, were almost blotted from the import lists during the European war, and with the encouraging development of the national mines in response to necessity, plus a greatly extended use of petroleum as fuel for in-

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dustrial purposes, its pre-war place is unlikely to be recovered.

Looking down the lists of Chilean imports, the tendency towards importing materials in the crude state or simply prepared, for working-up in national factories, shows an immense increase since 1914; dependence upon national supplies also increases markedly. Metals in bars or pig, worth less than 400,000 pesos in 1914, were imported to the value of nearly 5,000,000 pesos in 1919; at the same time the value of imported lumber dropped from nearly 3,000,000 pesos to 1,250,000. The value of live animals imported — chiefly pedigree horses and cattle from the United Kingdom and North America, to improve the already excellent livestock of the Chilean farms — went up with a bound at the end of the war, totalling 12,000,000 pesos in 1918; the importation both of leaf and prepared tobacco shows systematic growth; but purchases of foreign meats, butter and cheese, show consistent falls.

The value of sugar imported rose between 1914 and 1920 from 9,000,000 to 25,000,000 pesos, but this movement indicates soaring prices rather than increased Chilean consumption. Purchases of yarns for weaving, of textiles, bags and sacks, and ready-made clothes, all displayed rises in the same period from 48,000,000 to 123,000,000 pesos; so also did crude chemicals, particularly essences for nationally elaborated and bottled perfumes. Imports of machinery, checked during the war period, followed the same curve as electrical goods, doubling their values in 1919 as compared with 1914.

Chilean purchases of tools and implements have shown steady increases, but the whole group of machinery for mining, agriculture and industry, including motors, boilers and electrical goods, does not far exceed 38,000,000 pesos (less than £2,000,000 at 20 pesos to the

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pound sterling), while material for railways and other transport services costs some 20,000,000 pesos, or about £1,000,000 sterling annually. A fair average for Chilean purchases abroad may be calculated at £20,000,000 or inside $100,000,000 U. S. currency, at normal exchange.

Sales to Foreign Countries

When one turns to the other side of the ledger, to see what Chilean merchandise is exchanged for these imports, the dangerously dominant position of nitrate becomes evident. The total exports rose from 300,000,000 pesos in 1914 progressively to nearly 764,000,000 in 1918 (subsequently suffering violent fluctuations) and of the latter amount nitrate and iodine accounted for over 532,000,000, with another 109,000,000 placed to the credit of "minerales metálicos en bruto," of which the chief if not the sole representative was copper.

Products of livestock farming, chiefly hides and wool, have risen in export value during the last few years, and may be reckoned as worth an average of 35,000,000 pesos; vegetable products shipped out, with cereals predominating, have varied lately between 14,000,000 and 42,000,000 pesos; manufactured foodstuffs (dried or frozen meat, sugar, cheese, flour) have grown in value since 1914 from 7,000,000 to nearly 24,000,000 pesos; 1,000,000 pesos' worth of wine is exported; some pottery, glass and leather; and an increasing quantity of unworked lumber. But none of the farming, metallic, forestal or manufactured merchandise groups show signs of growing ability to equal nitrate in export values. Fortunately, the world needs Chilean nitrate, and there is no prospect of the rise of a rival which could meet the naturally produced chemical in price if drastic and feasible cuts were made in export taxes.

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Disorganization of world markets since 1914 has affected the imports of Chile not only as regards bulk but also origin of supplies. It will probably not be possible for a judgment to be formed concerning the trend of trade until after 1922, when the flow of commerce may have resettled into regular channels. The general effect of the war years was to send merchandise north and south instead of east and west: a big increase occurred in the trade relations between North and South America, while the stride in commerce between the different South American nations was perhaps even more remarkable.

Intercourse amongst the sister nations has been delayed in the past by lack of coastal shipping and international railways as much as by laws of supply and demand. It has been frequently said that the different Latin-American states have nothing to sell to each other because they all produce the same class of goods, needing similar commodities only to be obtained from the advanced manufacturing countries. The latter part of the contention has a great deal more force than the first; South America must buy certain classes of goods afield, but a careful scrutiny of production lists brought to light, after 1914, many prime materials that could be exchanged, the impetus given to a coastwise traffic (*cabotaje*) along both Atlantic and Pacific Coasts proving the success of the new efforts. Several Latin-American states own maritime lines, but Chile and Brazil in particular aid the new inter-American trade development with excellent steamship and sail services under national flags.

Brazil doubled her sales to Chile between 1914 and 1919; Argentina increased the value of her shipments from under 6,000,000 pesos (Chilean gold, of eighteen pence each) in 1914 to 31,000,000 four years later;

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Colombia and Costa Rica increased their sales of fine coffee (via Panama); Ecuador sent more cocoa and Peru more fruit and sugar — Peru's sales, worth 14,000,000 pesos in pre-war years rising to over 32,000,000 in 1919. Mexico's sales to Chile rose from a few thousand pesos in value to over 7,000,000, during the last six years.

Chile at the same time made big increases in her own shipments to Latin-American countries. Her sales to Argentina rose from 4,500,000 to 26,000,000 pesos at eighteen pence; to Bolivia, from 4,000,000 to 8,000,000; to Peru, from 3,000,000 to 18,000,000; to Mexico sales were doubled during war years. In some cases, as those of Uruguay and Brazil, there have been fluctuations so marked that no conclusions can be drawn: but on the whole the stimulus to inter-American trade has been well sustained.

With the United States a tremendous development of traffic took place. Exports from Chile rose from 86,000,000 pesos in 1914 to 489,000,000 in 1918; at the same time Chile's purchases from the United States, totalling about 55,000,000 pesos in 1914, soared to more than 203,000,000 four years later. In the case of both exports and imports, values were inflated and have not been sustained, although the development of the North American mercantile marine since 1914 is likely to promote a greater share of commerce with South America than was normal before the conflict. It is interesting to note that despite the huge expansion of North American trade with Latin America during war years, inflation in all directions was so great that the proportion of business done by the United States with South America remained the same as it has been for a hundred years — 5 per cent of the total exterior commerce.

A remarkable series of changes has been experienced

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in the export lists of Chile during her economic life. In early days one of the most important exports appeared on shipping invoices as "Bezoar stones," those curious concretions, forming in the bodies of certain vegetable-feeding animals, which were considered medicinally potent in the Middle Ages. Faith in the Bezoar stone and supplies came from the East to Europe, but after the discovery of the Americas it was found that the llama and guanaco also formed the precious object, and trade grew brisk.

Once upon a time Chile shipped the bulk of her copper to India, taking Oriental cottons and other merchandise in exchange; this trade has long been discontinued, although Hindu as well as Japanese retailers are reviving business with Chile. Up to 1887 Chile was still exporting the skins of vicuña, now vanished from her confines, and the beautiful chinchilla, also practically extinct in Chilean uplands.

The trade with the eastern side of the Andes in Yerba Maté received a blow when with Independence it was possible for freer commerce to offer Indian and China teas to the former colonies of Spain; but the peasant classes of Chile are still faithful to the maté and the bombilla, and a decreased but steady import continues.

Foreign Firms in Chile

Commercial conditions upon the West Coast of South America are sharply distinguished from those of the Atlantic and the Caribbean by the establishment of a number of powerful firms doing both import and export businesses, owning and operating factories, and possessing widely extended branches.

Several of these houses are British, their foundation dating back to the early days of Chilean independence

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more than a hundred years ago; much of the mercantile enterprise, as well as the milling and nitrate refining industry, is indebted to these companies for capital and inspiration. With European alliances also is a strong North American firm, interested in general business, factory development and nitrate, and running a line of steamers between North and South America, while still more recent newcomers are the important Jugo-Slav firms operating all the way from Punta Arenas to Antofagasta, and rapidly increasing their interests in nitrate and other extractive industries.

The largest of the British firms operates sixty branches or agencies throughout Chile, and while importing machinery, tools and agricultural implements, hardware, sacks, rice, coffee, etc., also buys and ships country produce. Another house deals largely in textiles, and a third is chiefly although not exclusively interested in the nitrate country, where in addition to refining and exporting the *salitre*, the firm is a big supplier of machinery, foodstuffs, and all supplies for the town-camps in the nitrate fields.

These large houses do not secure a monopoly of business; side by side are numbers of smaller local firms of various nationalities: but their existence and system of operation is a salient fact in the foreign trade of Chile. The repute of the majority of these strongly entrenched houses stands high; their representatives are men of character and ability, and the organizations have not only created and built up Chilean commerce in the past, but are of great value today. Their services are never more strikingly proved than in such times of stress as those of 1921, when small and inexperienced firms broke under the storm that the big organizations were able to meet with all the strength of long usage and wide credit.

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It is sometimes complained against this array of impregnable commercial castles that their influence tends to render the West Coast a territory offering but a cold welcome to the newcomer in trade. I have heard the establishment of the heavy tax upon commercial travellers in Chile charged against the suggestion of the big houses. But even if there is foundation for these complaints, there is something to be said on the other side — for instance, that the old-established firms, having sown for several generations, are not likely to be enthusiastic when a brand-new reaping hook makes an appearance. Thinking of their long cultivation of the soil, big investment, and big overhead charges, they are apt to regard the débutant travelling salesman as a raider, and are not extraordinary in looking askance at comprehensive plans launched during the last few years for direct selling to consumers by groups of home manufacturers.

As a matter of fact Chile is not singular in levying a heavy tax upon the commercial traveller, and its assessment may be regarded as partly due to the pressing need of Latin America during recent years to discover new sources of revenue. Few American countries have even attempted to face the difficulties of the direct tax, and with their chief source of revenue derived from import and export dues, are affected immediately by every change in the commercial barometer. In times of stress all possible founts are examined and in the course of this search the foreign commercial traveller himself has come to be regarded as amongst the imports. It is true that he is still rather a necessity than an article of luxury, and it is recognition of this fact that may help to account for the frequent evasion of payments of the tax.

Chilean law requires travellers representing foreign firms to buy in each province visited a *patente* (licence)

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costing 1000 pesos; with the paper peso at an exchange value of one shilling, this is equal to £50, so that in order to traverse Chilean commercial towns from Valdivia to Coquimbo the traveller would have to spend £400 or £500 on licences. The consequence is that visits are either confined to a strictly limited number of cities — perhaps, to Santiago and Valparaiso only — or an arrangement is made by which the trade representative carries the business card of a local house, and is thus not subject to taxation, or rents an office in Valparaiso, pays the normal trading tax imposed on all businesses, and operates freely from that central point. Chile does not trouble the temporary visitor with the host of small charges and restrictions that exhibit local ingenuity in many parts of South America during the last few years, and which include prohibitions against the entry of a typewriter except under a heavy tax; permits to depart from the police or port captains; demands for new vaccination and other medical certificates; inspection and re-stamping of passports; charges upon samples and catalogues, and, worst trial of all, removal of baggage to customs-houses for leisurely future inspection. In Chile one is as free of this bureaucracy as in England before the war.

From commercial rivalry, whether between different groups of foreigners or between foreigners and the Chileans who have for the last twenty-five years taken so vivacious an interest in trade, Chile in general is bound to benefit. The effect of time tends to take retail business more conspicuously than wholesale or big import and export trade from foreign hands and into Chilean, not only on account of ability but because a house beginning life as an exotic has often become Chilean through the domestic ties of its founders. The children of an enterprising foreigner who marries, as so many

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foreigners have done, a Chilean wife, are generally Chilean-born and educated, and cling in later life to the pleasant land of their birth; a rapid naturalization of blood and of capital is one of the outstanding features of Chile's economic history.

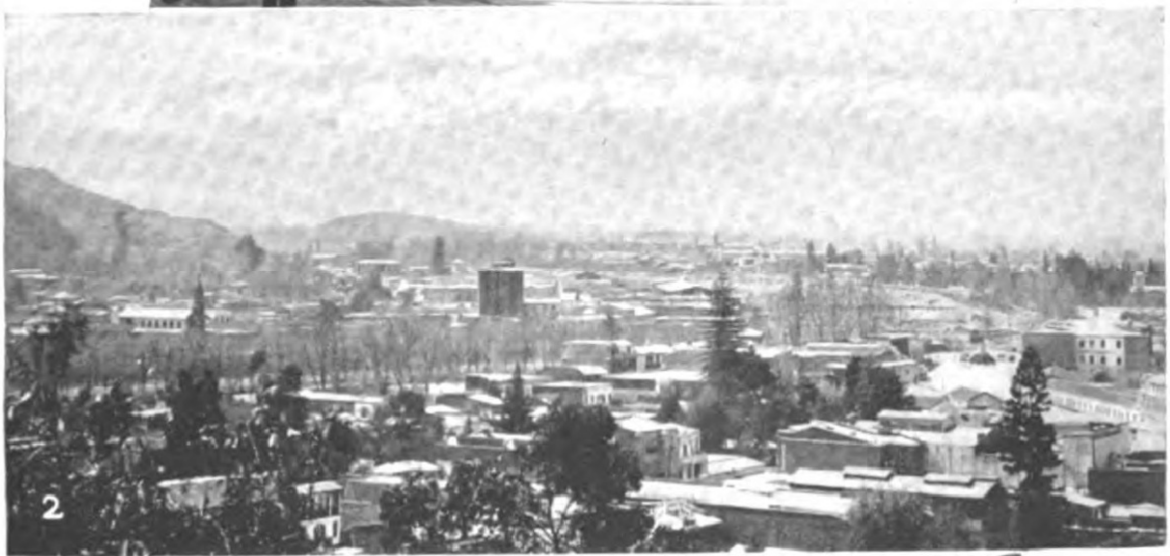
Trade-marks

The question of trade-marks in Chile is attended by the same difficulties which merchants offering goods from manufacturing countries encounter in many young lands where national rights in discoveries and inventions present few home problems. Broadly, Chilean law gives rights in a trade-mark to the first person registering the mark; and it is not unusual for a foreign maker or agent, entering the country with some special product for sale, to find that his emblem has been already registered by some enterprising and unscrupulous person, who must be bought out if any business is to be done by the original owner. Litigation has raged about this matter, but the only safeguard consists in speedy registration in Chile — and all other parts of the Americas where no international convention is in force — of the trade-marks of any article which is likely to be sent here for sale.

Chile has had a patent law since 1840, but that in force today was decreed by Barros Luco in 1911; it is modelled upon similar laws in other lands, but there is a time limit of two years within which the patent must be "worked." In practice, however, the patentee as a rule obtains a ten-year extension of the term within which his rights are not liable to forfeit in case no active use is made of them.

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The Post Office, Santiago.
Santiago, with the Snow-capped Andes in the Eastern Distance.
Subercaseaux Palace, Santiago.

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CHAPTER XI

TRANSPORT SYSTEMS

Railroads. — The Transandine Line. — Sea Transport. — Rivers and Lakes. — Roads.

CHILE possesses 8600 kilometres or 5375 miles of railways, of state and private ownership that, running throughout her main territorial length north and south, and connected with the sea by a number of transverse lines, serve her better than any other South American country is served.

The rule all over the continent is that the seaports are the chief points where population is grouped and that from these ports railways have been driven inland as pioneers opening new country. Many of the regions thus served are immense, as a glance at the map shows; great fans of steel rails spread from Buenos Aires, S. Paulo and Montevideo, for example. But these lines were built to serve, and do almost exclusively serve, the needs of special localities lying inland from a coastal point, and only in a few instances are these regions systematically linked to the rest of the country.

The construction of Chile's great longitudinal services was forced upon her, luckily, by the peculiar topographical form of this part of South America. All the long folded ribbon of the Central Valley is a natural highroad, and the railways follow very ancient trails.

From Tacna, in 18° of south latitude, lines run almost continuously to Puerto Montt at the edge of the Gulf of Reloncaví in 41′ 50″ of south latitude, a distance of

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about 1500 miles. From this great main artery of traffic touching all the important producing regions of the Central Valley, branches run west from thirty different points to the Pacific; the length of these connecting links is short, averaging 30 to 50 miles.

To the east a number of small lines extend to serve mining or agricultural regions, and three long arms have been flung across the mountain barrier of the Andes. One of these, the Transandine line, forms the only existing railway system connecting the Atlantic and Pacific Coasts of South America, the distance from Valparaiso to Buenos Aires totalling 1444 kilometres, or 896 miles, the journey taking two days.

The second line climbing the Andes is that extending from Antofagasta to La Paz in Bolivia, 863 kilometres or 518 miles. The third also runs to La Paz, from the former Peruvian port of Arica, a distance of 433 kilometres or 260 miles.

The policy of the Chilean Government as regards railways had its beginning in 1852, when President Manual Montt inaugurated construction of a line to unite Santiago and Valparaiso, a cart road built by Ambrose O'Higgins then serving these two important and growing cities. In a straight line the distance between Santiago and the port does not exceed 55 miles, but the coastal range rises in this region to unusual heights, and in order to negotiate the crest a curve was made northward passing by Limache, Quillota and Llai-Llai, the length totalling 187 kilometres, inclusive of the section now forming a part of the great longitudinal system. The first part of the line completed, between Valparaiso and Viña del Mar, was opened to traffic in 1855; the extension to Limache, in 1856; to Quillota, in 1857; construction of the San Pedro tunnel, together with delays resulting from the revolutionary troubles

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of 1859, held back completion of the extension to Calera until 1861; Llai-Llai was reached in 1862, and the whole line opened to traffic through from Valparaiso to Santiago in September, 1863. A new line is now planned to follow a shorter route via Casablanca.

At the same time that this sea-to-capital link was commenced the Government authorised the construction of a main line running south by a private company, the Ferrocarril del Sur, while in the north a number of railway enterprises were also undertaken by individuals or companies, chiefly with the object of serving mineral regions. The majority of these companies were capitalised in London, although the concessions were in some cases obtained by American promoters such as Henry Meiggs, afterwards well known in connection with Peruvian railroad building, and the genial William Wheelwright. Hundreds of young British and American engineers entered Chile at this period of early construction, while native-born Chileans still lacked technical training, and scores of them remained in the country permanently, settling and founding families. It was a tremendous era of building which lacked coherence but nevertheless was intelligent and forceful; every strip of line had its sound *raison d'être*, served its immediate purpose, and not only marked an industrial movement but remains today as a permanent contribution to the transport needs of Chile.

Actually the first railway line to operate in Chile was the Copiapó line running from that celebrated and then flourishing copper mining centre to the little port of Caldera, 55 kilometres distant. Construction was begun in 1850 and the line was opened to traffic in 1852, the Copiapó railway thus achieving its place as the second oldest railroad in South America. First place belongs to the Demarara line in British Guiana.

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By the time that the Valparaiso-Santiago railway was completed the southerly trunk line had been pushed as far as San Fernando, with extensions surveyed to Curicó and Talca. Curicó was reached in 1867 and was promptly sold by the private constructors to the Government of Chile, already marking out its continued policy of state ownership of transportation systems. Until about 1870, when both imported and native coal began to come into use, the fuel burnt by the locomotives of the central sections was Chilean wood, a circumstance which was material in helping to destroy the woodland of Central Chile.

To the north, Carrizal had a mule tramway running thirty miles from the copper mines to the sea; it was superseded in 1863 by a steam line. The Coquimbo railway was begun in 1856, afterwards taken into the state system but originally a mining line; as also was the Chañaral strip, linking Pueblo Hundido, another of the early pioneers; the Tongoy railway, begun in 1867, and running to Ovalle; the line connecting Vilos and Illapel, and that joining Huasco and Vallenar.

By the year 1885 the Chilean Government owned 950 kilometres of railway, while private companies owned 1254 kilometres. The result of the War of the Pacific gave a spurt to extension of nitrate railways, several of which had been begun in the great salitre regions, while the developing industry brought public revenues to the Moneda, permitting the acquisition or extension of state lines. Twelve years later the Chilean Government was operating 2000 kilometres of railways, while private owners operated about 2300 kilometres.

In 1910 the Government had extended its lines to Puerto Montt in the south, and ran north to meet the nitrate railways, a gap remaining in the latter section between Cabildo and Pintados, where the lines serving

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the Tarapacá fields reached their farthest southern point. An arrangement was reached for completion with two British syndicates. The Government now controls over 4600 kilometres of line, while private owners control about 4000 kilometres.

The state lines provide comfortable and cheap passenger transport, carrying goods also at reasonable rates. Travel is an inexpensive pleasure, the service is punctual, and equipment good. It is doubtful if more exquisite scenery can be enjoyed anywhere in the world at a like cost. But, like many richer and more experienced governments, that of Chile consistently loses money on her national lines. Only during the busy years of 1915, 1916 and 1917, when depleted steamship service sent more traffic to the railways, did the state lines show a profit. Since the Armistice, losses have been increased, 1919 ending with deficits variously computed at 14,000,000 and 40,000,000 pesos.

Previous to 1918 the private lines always earned profits, but disorganisation of the nitrate and copper industries, together with the low rates sustained, caused considerable entries on the wrong side of the ledger during 1918 and 1919.

With two exceptions the Government lines form a homogéneous network extending north and south and flinging out arms to vital points. But there are two isolated lines. One is the strip on the Island of Chiloé, connecting Ancud with Castro, 98 kilometres long; the second is the Arica to La Paz railway, 438 kilometres in length, joining this old Peruvian port to the capital of Bolivia.

This line is of special political interest, besides presenting a fine engineering feat — for it reaches an altitude of 13,000 feet above sea level. Forty kilometres

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are on the rack system. The line was built in accord with an agreement made with Bolivia after the War of the Pacific, the same Treaty that deprived Bolivia of her coastal belt promising her a new outlet to the sea as a seal of peace. The Arica-La Paz railway cost £2,900,000, was opened to traffic in 1914, and the section traversing Bolivian soil, 238 kilometres long, is to become the property of Bolivia in 1928.

The private lines represent an investment of 238,000,000 pesos of eighteen pence, or £16,800,000, as against the State's capital expenditure of 394,000,000 pesos, or £29,550,000. The most important group of private lines are those serving the great nitrate pampas, and the largest operators are the Antofagasta and Bolivia Railway Company. The lines of this English system date their inauguration from 1873, extend over 925 kilometres, of which 482 lie within Bolivian territory, and carry traffic from Antofagasta to La Paz at the same time serving a great nitrate area. Branches run to the salitre of Boquete, to Chuquicamata, to Conchi Viejo and the Collahuasi mines, within Chilean confines. Equipment and management upon this line, with its excellent dining and sleeping cars, are of a high order; total capital invested, £8,550,000. In addition to this system, the company has since 1916 operated the northern section of the Government's longitudinal railway, about 800 kilometres long. Next in importance of the private railways is a network connecting the nitrate fields of Tarapacá with the ports of Iquique and Pisagua, owned and operated by the Nitrate Railways Company Ltd. (London). The first concession for building the line was obtained in 1860, the total investment amounts to over £2,000,000, and the company operates 578 miles of line, of 1.43 metres gauge. The services rendered by this well-equipped

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line are best realised when the number of nitrate oficinas utilising the railroad are added up and found to total sixty-nine.

The Taltal Railway Company, Ltd., is another British line, operates 298 kilometres of track of 1.06 gauge, and links the salitre pampas of that part of the Atacama desert lying within Antofagasta province with the port of Taltal. The investment totals £1,050,000.

Also British is the railway connecting a large group of nitrate fields with the port of Caleta Coloso, the Cia. del Ferrocarril de Aguas Blancas, with 221 kilometres of track of 1 metre gauge; the network belonging to the Compania de Salitres y Ferrocarril de Junin, operating 89 kilometres of 0.76 gauge track and serving oficinas near the coast of Tarapacá; the lines of the Cia. de Salitres y Ferrocarril de Agua Santa, uniting nitrate works at Agua Santa, Negreiros and Huara with the port of Caleta Buena, 109 kilometres; and the Anglo-Chilean Nitrate and Railway Company, Ltd., linking the nitrate pampas of Toco with the port of Tocopilla, 122 kilometres in length.

Also of British construction, capitalisation and operation is a short line, dating from 1855, connecting the city of Tacna with the port of Arica, 63 kilometres of 1.43 metre gauge track; and formerly British, but sold in 1920 to the Lota Coal-mining Company is the railway connecting the city of Concepción with the ports of Coronel and Lota and with the flourishing coal mine of Curanilahue. The British owners were the Arauco Company, Ltd., operating 103 kilometres of 1.68 metre gauge track. The line from Los Sauces to Lebu, whose construction was suspended during war years, is also a British enterprise.

Chilean capital and enterprise is responsible for several private lines, as the Ferrocarril de Copiapó,

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whose first conception was due to Juan Mouat of Valparaiso, in 1845. The original line connected Copiapó with Caldera Port, 81 kilometres, but extensions were afterwards added to Pabellón, and thence, after acquiring a mule-tramway to the Chañarcillo mines, to Chañarcillo, another ramification running north-east towards the Argentine border but terminating at Puquios. The gauge of the line is 1.43 metres, and the length 231 kilometres. Also Chilean is the Ferrocarril de Carrizal y Cerro Blanco, uniting Carrizal Port to the copper mines of Cerro Blanco, due east, with a southerly branch to manganese deposits near Chañar Quemada and Astillas and another to the copper mines of Jarilla, the line terminating at Merceditas. The line with its branches has a gauge of 1.27 metres and a length of 184 kilometres.

The Ferrocarril del Llano de Maipo, running between Santiago and Puente Alto, 22 kilometres, is Chilean; so also is the electric line between Santiago and San Bernardo, 15 kilometres, and a similar link between Concepción and Talcahuano, as well as the short railway connecting Concepción and Penco. A new Chilean railway runs between Quintero Port and Cousiño, while the lines serving coal regions of the south are practically all Chilean today, but their length and direction is subject to change according to need.

The Ferrocarril Transandino por Antuco is the beginning of an ambitious Chilean project to cross the Andean barrier into Argentina at a low-level pass. The line starts from the station of Monte Aguilar on the state longitudinal railway, in the province of Concepción, runs almost due east towards the volcano Antuco and Lake Laja, and has a present extension of about 85 kilometres. It has a metre gauge track, will have a length of 129 kilometres when it reaches the

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Argentine frontier, the mountain pass which it is planned to traverse having a height of but 1862 metres above sea level, or not much more than 3000 feet. Within sight of this pass the river Neuquen has its rise, and it has been contemplated to follow its valley south-eastward to connection with the line running from Bahia Blanca.

A Chilean trading and cattle company with head-quarters in Valdivia is constructing a new southerly line, running eastward from the longitudinal station of Collilelfu, about forty miles from Valdivia, to Lake Riñihue: here a line of connecting steamers will carry passengers farther to the east, and a second strip of railway will connect with the lake of Pirihuaico, whose easterly point almost touches the Argentine border. About 40 kilometres of this line is open to traffic.

Far south, running from Punta Arenas to the coal mines of Loreto, is another small Chilean line of nine kilometres.

Of North American construction and operation is a 25 kilometre ore-carrying line between Caleta Cruz Grande and the Tofo iron mines; a narrow-gauge private line of 70 kilometres joining the copper mines of El Teniente (Braden Copper Co.) to Rancagua town; and a link between Pueblo Hundido and the copper beds of Potrerillos. German interests (Gildemeister & Co.) constructed a small line, for the exclusive use of a related copper mining company, from Challocollo to Cerro Gordo, in Tarapacá, with an extension to La Granja, in 1897, 36 miles of narrow-gauge track.

Investment in private lines (most of which are open to the public, but are distinguished from the state-owned railways) is reckoned at a total of 238,000,000 Chilean pesos of eighteen pence, divided amongst British companies, 209,000,000 pesos; Chilean, 24,000,-

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000; and North American, 5,000,000. The German investment of two or three millions does not appear in statistics of Chile since 1916. The former German-operated tramways of Santiago and Valparaiso have passed into British hands and are now controlled by S. Pearson & Son, Ltd.

Three new Andes-crossing lines are contemplated in Chile. Two are planned to the north of Santiago, the third to the south. The latter is already in construction as part of the state system, running from Cajón station, just above Temuco, through Cautín province eastwards. The mountain barrier is here below 5000 feet in height, and negotiation of the Andean section, plus extension to the Argentine line running west from Bahia Blanca, presents no difficulties beyond that of finding sufficient capital for construction. Chile's eastward extension will traverse the green fields of the Lonquimay Valley, crossing by the Pass of Maullin Chileno.

To the north, one project indicates a line extending east from Antofagasta through Boquete and Huitiquina on the Argentine frontier, and joining with Argentine systems at Salta; another plans a railway to continue the branch running out from Coquimbo along the Elqui Valley to Algarrobal and Rivadavia. Crossing the Andes by the Tortolas pass, the line would link with the Argentine system of Rioja province. Regarding the two first-named lines, the Argentine and Chilean Governments have agreed upon a close mutual policy, and work upon unified plans is being rapidly advanced.

The Transandine Line

Railway lines crossing the South American continent are sometimes said to be of less pressing importance

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since the opening of the Panama Canal rendered the West Coast more readily accessible from the western seaports of Europe and the eastern coasts of both North and South America. It is true that certain overseas commerce is served by the Panama route, exactly as it was encouraged when steam navigation made it possible for seamen to face the Magellanic Strait without misgiving, yet no one with knowledge of the internal needs of South America doubts the necessity for strengthened transcontinental links. Canada, with 8,000,000 inhabitants, built two transcontinental railroads: South America, with 75,000,000 people, has but one direct cross-country line completed.

This single railway from sea to sea — connecting Santiago de Chile with Buenos Aires by a two days' journey of 900 miles — is a remarkable piece of work, owing inspiration and accomplishment to the Anglo-Chilean engineer brothers, Juan and Mateo Clark. It has been open to international traffic as a through line since 1910, its operation stimulating not only the commerce of Western Europe and Chile, but aiding the development of brisk trade between Chile and Argentina. It was a reopening of ancient paths. Before and to a lessened extent during colonial times a score of passes over the Andes were in common use and the interchange of persons and goods continuous. Following Independence and the creation of sharp and sometimes jealous divisions between the republics, the countries were separated as never previously; old transcontinental trails were neglected. This neglect was increased by the interest taken in South America by the rich countries of Europe, the establishment of shipping lines to all the ports of the young communities, and the stream of gold and people directed towards the development of commerce and public services. For

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a century each South American state turned its face to the sea, economically and intellectually. The creation of the Transandine railway was the first deliberate conquest of the Andean barrier between eastern and western nations of the continent. A few miles of construction only are needed to connect up Bolivian railways with the northerly Argentine system. Ecuador is planning a link with the Amazonian headwaters to create a route for merchandise similar to that of North Bolivia, with outlet at Pará; but lack of population and production through vast interior regions has acted as a deterrent against transcontinental plans even more than engineering difficulties. These have been surmounted in South America in a number of instances, the mountain-climbing lines of Brazil on the east and of each of the four countries to the west offering famous instances of response to industrial need. But without the sound *raison d'être* of Mendoza's flourishing existence at the eastern foot of the Andes the present Transandine line would have waited longer for its creation.

Juan and Mateo Clark, planning the line, obtained a concession from the Argentine Government in 1872, and from the Chilean in 1874. Money was scarce and engineering problems many, so with a view to lightening the burden the route was divided into four sections, and construction performed by the group of corresponding companies. The longitudinal line built by the Chilean Government already had run a branch from Llai-Llai in an easterly direction towards the mountains, culminating in the station of Los Andes at 2733 feet above sea level — the old Santa Rosa de los Andes. This railway followed the ancient mule road towards Juncal and the Uspallata pass en route for Mendoza and Buenos Aires, and the eventual con-

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struction of the Chilean Transandine practically adopted the same course from Los Andes to the Argentine frontier in the heights. But this section, although but 70 kilometres in length, presented the worst difficulties and was the last completed.[1]

Three companies undertook construction of the strip between the Argentine frontier and Buenos Aires, 1373 kilometres long. The mountain section to Mendoza (2481 feet altitude) was built by the Argentine Transandine Company; Mendoza to Villa Mercedes (with a branch running north to San Juan, site of an ancient post-house), by the Argentine Great Western Company; and Villa Mercedes to Buenos Aires by a company subsequently called the Buenos Aires and Pacific Company. Money supplies came from London, where the companies are domiciled.

The Villa Mercedes-Mendoza link of 356 kilometres was completed and opened in 1886; the pampas-crossing section between Villa Mercedes and Buenos Aires, 692 kilometres, in 1888. This was all plain sailing, but serious difficulties were encountered in the mountain sections. Work began on the Argentine side in 1887, and upon the Chilean in 1889; in the latter case the indefatigable Clark brothers gave not only devoted energy but their own funds, suspending operations in 1892, after 27 kilometres were built, when their capital was exhausted. A year later part of the Argentine Transandine section was opened to traffic, but the operation of completed lines on the east had the effect of diverting all traffic from Mendoza to Buenos Aires instead of promoting international commerce as had been contemplated.

[1] On the Chilean side a rack system is employed for 23 kilometres; the maximum grade is 8 per cent. On the Argentine Transandine the rack system is employed for 14 kilometres, with grades nowhere reaching more than 6½ per cent.

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In 1904 a new firm, the Transandine Construction Company, London domiciled and financed, took over the Chilean section from the Clark brothers and their creditors, and finally joined the Argentine Transandine at the frontier station of Las Cuevas in 1910.

The old cart and mule road crossing the Cumbre rose to an altitude of 14,500 feet, and was, during the period of snow-storms, usually due between April and October, shut to all but the hardiest travellers. To obviate this ascent the builders of the Transandine drove a tunnel through the head of the Andean barrier, at an altitude of 10,521 feet above sea level; the tunnel "de la Cumbre" traverses a length of more than 3000 metres, the two transandine lines meeting within its length, at an altitude of 10,515 feet. With greater capital to spend, the Chilean Transandine constructors would have driven the tunnel through the mountains at a level about 3000 feet lower to avoid the storms raging about the higher regions, and ultimately this work will probably be performed: but it entails construction of a tunnel four times the length of that in existence.

Below the tunnel on the Chilean side the company shields the line with strong snow sheds, but here again lack of sufficient capital prevents the additions necessary if the line is to be safeguarded all the year round; at present there is danger of enforced stoppage as soon as the first heavy snows fall, blocking the line with twenty or thirty feet of drift and avalanches. More than once traffic has been suspended for three or four months.

In spite of difficulties, however, the line has proved to be of immense value to international traffic, has shortened the distance between West European ports and Valparaiso by over 2000 miles as compared with the Magellanic route, and 500 miles as compared with

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On the Chilean Transandine Railway.

Laguna del Portillo: near the Transandine line.

Santa Rosa de Los Andes: Chilean Terminus of the Transandine Railway.

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the Panama journey. With the operation of the Panama Canal the route between New York or Halifax and Valparaiso was shortened so much that it is a saving of time for a traveller wishing to reach Buenos Aires from a North American point on the eastern side to journey via the Canal and the Transandine. Buenos Aires has also been brought into closer touch with the Orient and Australasia, while Chilean towns are in quick communication with the markets of Argentina, Uruguay and Brazil.

Brisker traffic in both passengers and merchandise will be developed when unity in administration is in working order. But this has been long delayed, owing to the troubles connected with construction days. In 1894 the Argentine Transandine, observing with misgiving the remote prospect of completion of the Chilean link, formed an agreement by which the Argentine Great Western operated the section open to traffic, this arrangement being renewed in 1901 and 1905. In 1907, after some skirmishing and the commencement of a competitive line to Mendoza, the Buenos Aires and Pacific Company obtained control of the Argentine Great Western, and at the same time of the agreement controlling the Argentine Transandine, which line it guarantees from losses threatened by blocking of traffic through snow. Thus for many years the Buenos Aires and Pacific held the reins of all rail operations between the capital of the Argentine and the frontier of Chile, and was frequently charged with so arranging freight prices as to send all Mendoza traffic eastwards, while discouraging commercial interchange between Chilean markets and the prosperous Mendoza vicinity. The Chilean Transandine constantly pressed for a revision of management, proposing that the Argentine Transandine should be separated from the Buenos

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Aires and Pacific and united with the Chilean mountain-climbing link, so that a single administration should operate the line between Los Andes and Mendoza, the terms of the lease held by the Buenos Aires & Pacific Line allowing of cancellation at twelve months' notice.

Chilean and Argentine public opinion agreed upon the matter, the help of the two Governments was enlisted, special meetings held under the auspices of the Sub-Committee on Railway Transport of the Pan-American Conference held in Buenos Aires in 1916, an International Commission appointed to arbitrate upon goods rates between the two countries, in 1917, and a draft proposition approved in early 1918 between the diplomatic representatives of Argentina and Chile in London, acting in consultation with the directorates of the two Transandine companies. Chile agreed in August of 1918, and, in amicable agreement, the Government of Argentina, in December, 1919, accepted the proposal in principle; arrangements were made by which the new contracts with the Transandine lines should be simultaneously discussed in the Congresses of both countries. In early 1922 agreements were complete, details of unification of the railways was decided, provision made for new financing of the improved system, and tentative arrangements outlined with a view to new and liberal tariffs between the two countries, tending to encourage traffic not only via Mendoza, but also between North Chile and the Salta region, as well as between South Chile and Eastern Patagonia when the projected new Transandine links are completed.

Sea Transport

As regards sea transport Chile is in an enviable situation with her immense coastline giving speedy access

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to all inhabited parts of her territory. It is true that with a few exceptions, of which Talcahuano is the most notable, Chilean ports are little more than open roadsteads, exposed both to the south-westerly gales and to the dreaded "northers"; but modern engineering is doing much to solve the problem of safe havens where visiting vessels may anchor in safety. The same difficulty applies to almost the whole of the South American West Coast, and for centuries sailing vessels feared the region; during Spanish colonial times it was so common a thing for a ship to spend from six to twelve months on the passage between Callao and South Chile that when Captain Juan Fernández, running out south-west for a thousand miles, and afterwards turning almost due east for Chilean ports, managed to avoid the cruel coastal gales and made the passage in thirty days, he was haled before the Inquisition as a wizard. The Inquisitors, however, after careful examination of the captain's papers, set him free, applauding his sagacity. From that day the group of islands named to commemorate the navigator's skill became the beacon for vessels sailing to Valparaiso from the North, although ships returning to Peru still hugged the coast.

It is not uncommon for sailing vessels to be wrecked off the difficult southerly coast, with its innumerable indentations and furious storms, but the worst year of the present century was 1911, when 37 steamers as well as, by a strange coincidence, an exactly equal number of sailing ships, were cast away off Chile. That was a year of exceptional storms, but out of 32 years between 1887 and 1919, only seven passed without a record of wrecks; it is to the credit of the excellent surveying and charting work of the Hydrographic Department of the Chilean Navy that the path of the

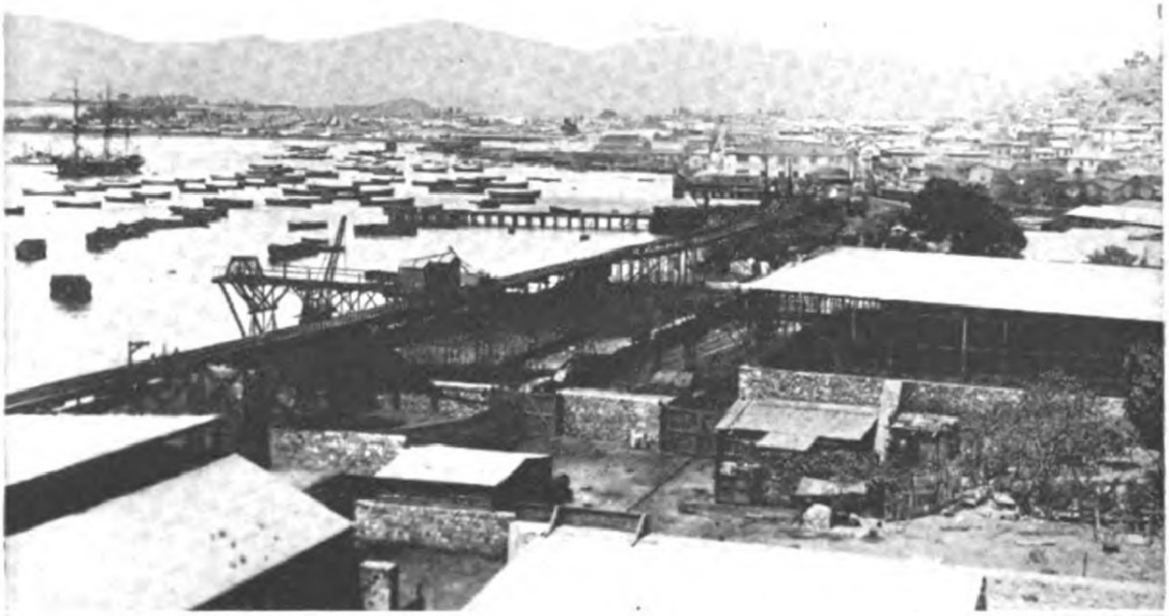
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navigator has been rendered plainer, while the Chilean Government has in hand a series of plans for the better protection of ports — lacking only the financial sinews of war against wind and tide.

Of Chile's fifty-four ports of major and minor importance, perhaps thirty are visited by international shipping. But of these only about fifteen display brisk commerce. Arica, visited by 400 foreign ships annually and over 300 Chilean vessels, connects directly with Bolivia; Pisagua, Junin, Caleta Buena, Iquique, Tocopilla, Mejillones and its younger sister Antofagasta, Coloso and Taltal, are nitrate ports, bustling when nitrate markets prosper and almost idle during the most depressed period of 1921. The copper ports of Chañaral, Caldera and Carrizal Bajo have suffered more than Coquimbo, with fruit and other farm exports to add to her diminished list of minerals. Valparaiso, chief port of Chile, receives about one thousand national and three hundred foreign ships yearly, one-third of the whole exports entering here, although Antofagasta and Iquique are the big exporters. In normal years, Valparaiso receives 1,400,000 tons of cargo, of which nearly half is coal. Farther south, Talcahuano, the chief naval base and the port for flourishing Concepción, receives about 400 vessels annually; Coronel, exporting and bunkering Chilean coal, receives about 700; Corral, the port for Valdivia, is visited by some 200 ships yearly; and Punta Arenas in the Strait of Magellan, does business with twelve hundred Chilean and about one hundred and thirty foreign vessels each year.

These ports will probably continue to be the great outlets for Chile's most thriving regions, but they are insufficient to serve the needs of a long list of growing districts, and in spite of much good planning are still

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Coquimbo, the "Capital of North Chile."
Ancud, the Port of Chiloé Island.
Zapallar, a beautiful Chilean Watering Place.

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inadequately equipped for the increasing work required. A special Government Commission, lately considering the question of more sea gateways, has decided that forty or so of the points along the Chilean coast should be improved for the reception of international shipping.

The Commission's recommendations necessitate the expenditure of at least six million pounds sterling, or let us say the whole of the taxes upon nitrate exports during one prosperous year. The sum will in all probability be raised, according to need, year by year, by means of exterior loans.

According to the projects, Valparaiso will be allotted a further million and a half pounds; Valdivia, Lebu, Talcahuano and Constitución, about one million each; Puerto Montt, a preliminary £150,000; Tomé (at the north of Concepción Bay) and Pichilemu, £40,-000 each; with smaller sums for Iquique and Puerto Saavedra (Imperial Bajo).

Valparaiso port works have been since 1912 in the hands of a British engineering firm, and have given a good deal of trouble, storms more than once undoing part of the construction work; in the early months of 1922 there were completed two quays totalling 840 metres in length, a breakwater of 288 metres, and a coal wharf 200 metres long by 30 metres wide; work upon the mooring jetty, the extension of the old Fiscal Mole (dating from 1883, and the only means for transferring passengers and cargo until the new quays were constructed), the Prat Quay, warehouses and railway is also well advanced, in spite of long delays caused by the European War. There is plenty of water — in fact, too much for facile construction of jetties or break-waters, the bottom shelving rapidly from 39 feet at the mooring jetty, and offering, less than 200 feet

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from shore, nothing but mud as foundation. In consequence, the outer section of the breakwater cost £560 per linear foot to build. Since 1906 Valparaiso has suffered from no serious earthquake, but slight shocks are not infrequent and must be taken into consideration in the case of construction in the sea as well as upon the land. Rise and fall of the tide at Valparaiso does not exceed three feet.

The Nitrate Ports have earned more money than any other points of outflow for Chilean products, but safe, adequate modern havens for shipping are not to be created in a day or even in a decade; and the same difficulties of the open roadstead and prevailing winds have delayed the completion of adequate facilities even at that busy commercial stronghold, Antofagasta. Comprehensive plans are, however, in course of development, and work has only been delayed by the depression of 1921.

Port improvements at Talcahuano are being carried out by a French company, and the main work is unlikely to be completed for a few years, although it has been attacked. Talcahuano lies within the deeply indented Bay of Concepción, the best naturally-protected haven upon the West Coast, and is further shielded from the effects of northerly winds by the pretty island of Quiriquina, once a rendezvous for pirates, and during the War the place of internment for several hundred Germans, including sailors from the *Dresden*. Talcahuano possesses a floating dock and equipment as the first naval base of Chile, and when the present plans have been developed this port will be one of the best in South America.

The creation of a secure port at the mouth of the fine river Imperial, Puerto Saavedra, will be comparatively easy when the projected cut is made from Budi

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Bay through a sandy bank into the river, safe from all storms. From this point the stream is to be dredged for 20 miles up to the town of Carahue, where a branch railway connects with Temuco and the Longitudinal system. Another important dredging work is projected along the stream of the Valdivia from Corral port. This haven of old foundation, nestling under its cliffs, has been for centuries of necessity the stopping-place for vessels with cargo and passengers for Valdivia City, twelve miles inland, all traffic being transshipped up-river by small steamers, barges, etc. By the new plans a channel will be deepened to permit the passage of ocean-going steamers to the beautifully placed riverine city, whence rail connection opens the most fertile agricultural country, immense forestal zones and a large coal-mining region.

At pretty Constitución, where the dangerous bar is so much dreaded that its condition is always signalled to vessels before they venture to approach, plans include the dredging of a channel and construction of breakwaters to prevent silting-up.

Puerto Montt, at the end of the Longitudinal, and lying within the Gulf of Reloncaví, is a recent creation whose equipment as a port receiving international vessels is still only on paper; this Llanquihue region, with its lumber and sheep industries, is fast developing, and will invite a great deal of tourist traffic when its transport facilities are equal to its glorious scenery. Port construction problems are chiefly due to the 25-foot rise and fall of the tide. At Punta Arenas, another new port of remarkably rapid and vigorous growth, vessels are still obliged to lie out in the Strait while cargo and passengers are transferred by lighters and small boats, but the steady prosperity of this zone as well as its position as a port of call for international

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steamers render imperative the creation of modern port facilities.

Rivers and Lakes

Chile has one hundred and twenty rivers, but can count no more than five hundred miles as navigable. This navigability is again limited to small vessels only, to which another five hundred miles of lake waterways are also open; motor boats and canoes are able to traverse another four hundred or so of rivers, but these are frequently broken by cascades and falls.

In pre-Spanish times the lakes and rivers of Chile leading towards the Andes undoubtedly served as channels for Indian traffic; the Rio Blanco, Juncal and Aconcagua led towards the mountains into what is today Argentine territory from the populous Central region of Chile, while the lower passes were crossed to the south by way of many river valleys and by such lakes as Llanquihue and Todos los Santos, a short strip only intervening between the latter beautiful water and the lovely Nahuel Huapi in East Patagonia. During colonial times, with the depopulation of the wilder country and the concentration of towns upon the seaboard, this traffic diminished and commercial exchange was limited to ocean transport, with, however, an increasing intercourse with Argentina when the then Chilean provinces of Mendoza, San Luis and San Juan developed trade with the new colonies of Buenos Aires. But below Chiloé the territory remained unknown, and it has only been within recent years that the southern lakes have been visited and surveyed.

As to the rivers during colonial times, if they were not treated with equal neglect, their capricious ways were permitted to absolve them from any great useful-

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Taltal, a Nitrate Port of North Chile.



Puerto Corral, the Port of Valdivia, South Chile.

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ness, and it has only been within the last twenty years that serious studies have been made with a view to restraining, preserving and freeing the torrential streams characteristic of the short, steep slope of Chile. All Chilean rivers are snow-fed, and are extraordinarily and violently augmented when the Andean snows melt; the northern floods are more uncontrolled than those of the south, tearing down from greater heights through open country where nothing but, eventually, heat and sand offer a check. Many disappear in the desert while still far away from the sea. The southerly rivers, flowing from lesser heights and passing through long forestal areas, are more constant in volume. It is only below Lebu, in 38 degrees of south latitude, that any Chilean river becomes even nominally "navigable," with the sole exception of a dozen miles of the Rapel.

Nevertheless, the longest Chilean river is in the north, flowing across Chile's widest province, Antofagasta; this is the Loa, fertilising oases in the desert and sheltering little groups of people today just as it offered a livelihood to indigenous folk in pre-Spanish days. The Loa, sometimes called the Calama, is three hundred miles long, but for half the year is not more than a thread at the bottom of a wide gully. Its nearest northerly rival is the Copiapó, about 170 miles, watering fruitful valleys like the capricious but equally invaluable streams the Huasco, Elqui, Hurtado, Limari and Petorca. A succession of rivers in the Central Region are untamed floods in the rainy season — the Aconcagua, Juncal, Blanco, Volcán, Colorado, Maipo, and Mapocho, Cachapoal and Rapel — none more than 125 miles long. Three or four of these rivers will be harnessed in the near future to yield hydroelectric force. Below to the southward, the Mata-

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quito, the Maule of ancient fame, the Itata and the exquisite Bio-Bio are all outside the navigable list, and the latter is distinguished by its exceptional length of about 200 miles as well as its beauty.

First among navigable rivers as one goes from north to south is the fine Imperial, with a watershed of about five thousand square miles, and a length of one hundred miles; it has a magnificent and constant flow, but only fifteen miles are navigable. The Toltén owns six navigable miles; the Valdivia, 125 for small boats and about 25 for larger craft; the Bueno is in a different category, for, with a length of not much more than one hundred miles, it has about 50 miles of navigable channel. The Bueno, in fact, is the outflow of two lovely lakes, Ranco and Maihue, and discharges 600 cubic metres of water per second, a flow second to none among Chilean rivers.

Still farther southward, the Maullín has thirty navigable miles; the Palena about twenty; the Aysen, no more than twelve. And next comes that fine and little-known river the Baker, whose length is said to be equal to that of the Loa in the far north, about two hundred and eighty miles, of which nearly fifty are navigable. Outside that list are the Bravo, Pascua and Serrano, except for the canoes of the south-dwelling Indians.

Of Chilean lakes, Llanquihue is the largest, with a superficial area of 1400 square miles; its great depth, averaging 360 feet near the shore, suggests that this is the crater of an old volcano. Skirted by the south end of the Longitudinal railway, Llanquihue counts several ports, with Varas as the oldest-established and the largest. This lake, with its near companion, Todos los Santos, is traversed by Chilean steamers; and there is

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regular traffic upon Riñihue and Ranco. The former lake is reached by rail to Los Lagos station, horses taking travellers thence to the edge of Riñihue, about 25 miles; a wild but glorious stretch of typical Chilean woodland, clothing the sides of a lovely valley, lies between Riñihue and Ranco, with its brilliant turquoise blue waters, and abrupt sides covered with ferns, foxgloves, fuchsias and a close growth of trees of bright green foliage. Small steamers cross the lake to Llifen, where there are famous curative sulphur baths.

From Puerto Montt southward is a long series of fiords, islands, indentations and inland channels whose intricacy and extent are unequalled even by the famous fiords of Norway. For natural beauty the Norwegian complex cannot compare with that of Chile, for no woodland exists in Europe that rivals the pathless, luxuriant, flower-hung forests of Chiloé Island, the Andean spurs of Western Patagonia, the broken archipelago of Chonos, and the noble mountains of the Strait of Magellan. Rich ferns and flowering shrubs, wild bamboo and pines and beeches, reach to the water's edge Through the thousand miles of this complicated chain of inlets and islands between Puerto Montt and Punta Arenas runs an almost continuous channel, continuation of the long depression which creates the deep fold of the great Chilean central valley. Steamers seeking sheltered waters from the Strait of Magellan northward need not emerge into the open Pacific, but turn north by Smyth Channel and run inside the barrier formed by Hanover and Wellington Islands. But at the Gulf of Peñas vessels are forced out to the turbulent ocean, a thin strip of land barring the way to the calmer waters of the Moraleda Canal. Chilean engineers have long projected a cut through this Ofqui bar, joining the mainland to Taitao penin-

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sula; for it is only 7000 feet wide; no doubt this necessary help to navigation will be given before long. With this opening effected, small vessels will be able to pass from Puerto Montt to Punta Arenas and Tierra del Fuego by a sheltered waterway, passing great forests, majestic glaciers, frowning snow-capped mountains, stark headlands and a thousand inlets and islands, a long panorama of splendid beauty.

Vessels of all nations visit Chile, Australasia and Japan sending regular lines to compete with the shipping of Europe, North America and Chile's sister South American republics, the total tonnage of visiting ships amounting on an average to over twelve million, of which less than five hundred thousand tons represent sailing vessels. Sea transport on the Chilean coast has undergone an immense transformation since Cochrane brought the first steamer ever seen upon the West Coast, the little *Rising Star*, in 1818. Traffic from North America and Europe comes today in a considerable proportion through the Panama Canal, but the next few years will probably witness a development of tourist traffic through the Magellanic waterway and to such beautiful Chilean islands as Juan Fernández, with its romantic history and wild beauty — undiminished by the local lobster "factory" supplying the tables of Valparaiso and Santiago.

Chile herself performs a fair share of maritime service. About one hundred large and small steamers fly the Chilean flag, with about 35 sailing vessels chiefly engaged in fishing and the transport of coal and lumber, the total representing some 75,000 tons. Over 40 per cent of "maritime movement" of Chilean ports is recorded by Chilean vessels, and strong support of national traffic was afforded in early 1922 by the passage

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of a new law restricting coastwise trade to ships registered in Chile.

The largest and most important of Chilean steamship companies is the Compañia Sud Americana de Vapores, Government-supported, with head-offices in Valparaiso, operating a fine and excellently-equipped fleet of ten vessels serving Chilean and Peruvian ports, and, since the War, extending its international service through the Panama Canal to New York and European ports. Two new vessels of 7000 tons each were added in 1922 to the company's fleet: the *Aconcagua* and her sister ship were built at Greenock, and bring the Sud Americana's first-class passenger service to a high standard.

Roads

Chilean highways, placed though they are in scenery so lovely that the traveller's eyes are directed to mountains and tall trees rather than to the morass at his feet, need the improvement projected by the Road Law of 1920, arranging for special taxes to be devoted to the construction and upkeep of first-class country roads.

Reasons for the long neglect of this means of transport include the fact that farmers and countryfolk in Chile commonly ride horseback — this is a land of good horsemen and well-trained animals — and the condition of the surface if not a matter of indifference is of less concern than if vehicles were more common. Next, country produce has been in the past, and in many regions is yet, brought from the farms by heavy ox-carts, pulled by teams for whose convenience, again, a smooth surface is not considered a necessity. The third reason, which perhaps should have foremost place, is the nature of a great part of the Chilean soil.

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As soon as one enters the Central Valley of Chile, one recognises a characteristic of the Pacific Coast, the fertile and extremely fine soil, as light as face-powder, with its slightly pungent scent. Much of this soil is volcanic ash, with a mixture of vegetable detritus; it is extraordinarily fertile, with almost every virtue in the eyes of the farmer, and undoubtedly this genial soil produces the best food in the world. But it is difficult to reduce fine dust to the consistency of a road with a surface hard enough to resist the disintegrating effects of an eight-months' drought, followed by tremendous and violent rains.

Between the double row of blackberry hedges, backed by lines of poplars, a typical road of Central Chile is a deep trough of shifting, floating dust in the dry season, and a swamp after the rains set in. Once upon a day in May the writer with a party of friends tried to reach Los Andes from Santiago in a motor-car: the Chilean chauffeur and the car both did their excellent best, but a mile or two outside the capital the highway became a sea of mud, and we finally gave it up when the car skidded upon the top of the Chacabuco Pass. During the fifty or sixty miles traversed before we reached a railway station, the only strip of really hard foundation for the wheels was encountered when we ran in the gravelly bed of a shallow stream.

This test, however, was not quite fair to Chilean roads; the season and the route were not chosen with discretion. For even in Central Chile there are well-made, wide roads, a few hundred miles in each province, over which motors may pass. The coming of the automobile renders the creation of better highways an urgent necessity, in fact, the motor lorry promising a means for getting farm produce to market that is badly needed in the developing districts.

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Antofagasta, with its hard-surfaced nitrate fields, owns about six hundred miles of first-class roads; a record equalled only by the big Territory of Magellanes in the far south, where the sheep-farmers of the newly developed estates have made roads across Western Patagonia. In each of these two regions the climate, although in the North almost unbrokenly dry and in the South almost unbrokenly humid, is equable, lacking the sharp and destructive changes of the Central region. It must be owned, however, that the proportion of roads to area in great southern territory is one mile in length to each fifty square miles of land.

Altogether, Chile is officially stated to have between six and seven thousand miles of highway in first-class condition, with Coquimbo, Atacama, Aconcagua, Santiago and Tarapacá following the two provinces named above in length of highways in good condition. The new law aims at putting another six thousand miles of road into the same category within the next few years, out of the total of all classes reaching a mileage of nearly twenty thousand.

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CHAPTER XII

FINANCE

Conversion Fund. — Currency. — Debts. — Public Revenues.

WHEN the war in Europe broke out Chile was on the point of establishing a Conversion Office upon lines similar to those followed by Argentina and Brazil. The object was fixation of the exchange value of paper currency by the creation of strong gold reserves, and under normal circumstances Chile's office would have begun its work in 1915. It has not been possible, up to the end of 1922, to open the "Caja de Conversión," although funds are maintained on deposit with this purpose in view in Chile, England and, upon a much smaller scale, in the United States. Funds amounting to over 30,000,000 pesos of eighteen pence were also lying in Germany when war broke out, but these were, by special arrangements with the Allies, withdrawn during war years.

The total amount in the Conversion Fund in 1914 was over 108,000,000 pesos of eighteen pence. Of this less than 4,000,000 was held in Chile, and more than 74,000,000 in the Bank of England, besides the deposit in Germany. The reserve was increased during the following year, standing at 111,000,000 pesos at the end of 1915, or about £8,300,000, but was reduced to 88,000,000 in the following year when the National Congress authorised the utilisation of £2,000,000. This money was drawn upon to pay off Treasury Bills

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issued in conformity with the decree of January, 1914, for the purchase of vessels for the Chilean Navy and the construction of port works, but has been gradually replaced until in 1919 the total Fund amounted to over 114,000,000 pesos, of which 67,000,000 were banked in Chile and the remainder in England. At the beginning of 1921 Chile possessed £2,300,000 on deposit in the Bank of England, or nearly 31,000,000 pesos of eighteen pence; and to the credit of the Conversion Fund in the Casa de Moneda in Santiago had bar gold, $400,000 United States gold money, £78,845 of English money, and other specie, amounting in all to nearly 84,000,000 of pesos.

The withdrawal of funds from the Conversion reserves for special purposes was not unprecedented. Three years after the inauguration of the Fund in 1899 (when it was hoped to begin conversion operations in ten years' time) 20,000,000 pesos were used for military expenditure, this sum being practically replaced in 1904 by proceeds of the sale of certain old cruisers.

Gallant efforts made to bring up the Fund to a point justifying the opening of the Conversion Office have been rendered abortive by the hard times of late 1920 continued throughout 1921, but the intention of Chile's financial advisers is maintained and appears only to await the accumulation of sufficient gold.

At the same time the fact that credit and not gold is the true basis of economic prosperity has been forcibly impressed upon South America since 1914. Countries possessing big reserves of gold have been observed to suffer from depreciation of their paper currency, and, what is worse than depreciation, from constant fluctuation in every economic breeze, despite all the efforts of experienced financial experts; and on the other hand

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countries which were able to trade advantageously during the war and thus to pile up immense stocks of the precious metal have been seen to experience a demoralising paralysis of their markets — to be choked with their own gold.

The fact that those countries whose fiduciary issues have sunk to an apparently ruinous level are on that very account able to export their merchandise with profit, taking payments in comparatively valuable currencies and paying their way at home in depreciated paper, is illuminated by the lesson of the territories with currency maintained at a high exchange rate by gold backing, which are unable to find buyers of their products because no outsider can afford to pay the exaggerated rates of exchange. However, exporters are not the only persons to be considered, and the general uncertainty of commerce, together with the natural timidity of foreign capital when invited to lands with persistently variable currencies, will undoubtedly act as an incentive towards establishment of the Conversion Office in Chile.

Currency

Exchange values of Chilean currency, as well as several other forms of financial statistics, are officially given in sterling, the use of English monetary terms resulting from the establishment of financial and commercial relations with the United Kingdom in the earliest days of Independence, and from the fact that Chile's first exterior loan was obtained from London. The "gold peso" is fixed in exchange value at eighteen pence, while the paper peso reflects economic conditions from day to day.

Since 1871 the average value of the Chilean peso in

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comparison with sterling has fluctuated from just over forty-six pence in 1872 to seven pence in the worst days of 1915 and a drop to nearly sixpence in the slump of 1921–2. For the last fifty years the exchange value has tended to decrease, due chiefly to repeated issues of the paper money which replaced the gold and silver coinage of the Spanish colonial régime, when a peso was worth (1800) the equivalent of four English shillings. The creation of paper money was, however, unavoidable in the circumstances, and so long as a country possesses a sufficient quantity of some recognised form of currency, the material of which it is composed is not a matter of local importance, although exchange values may be grievously affected.

All the gold minted into Chilean money has disappeared from circulation, the finely designed little coins being retained only as curios or mementos since 1875, when severe depreciation of silver values rendered gold higher priced as bullion than as currency. The gold peso is today no more than a financial term. Officially, gold coin has an existence, as the condor, of 20 pesos; the doblón, of 10; and the escudo, of 5, but the currency actually in use is paper, well printed, in denominations from one peso upwards, with silver coins of 1 peso, 20, 10 and 5 centavos, and nickel coins of 20, 10 and 5 centavos. From more than one country of the Americas, silver has disappeared entirely when the depreciation of paper has borne down the purchasing power of the peso or other unit to a point below the market price of the metal, but Chile has so far escaped this denudation in difficult times. At the beginning of the present century the value of the Chilean peso stood at 15 to 16 pence until 1906, when the tragic effects of the earthquake that temporarily destroyed Valparaiso reduced credit.

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Between 1907 and 1914 it fluctuated about ten pence, went down to an average of eight pence during 1915, rose to nine pence in 1916 when demands for nitrate increased, to about thirteen pence in 1917 and nearly fifteen pence as the average in 1918; in June of 1918 the peso soared to an exchange value of over seventeen pence, but dropped quickly when the Central Powers signed the Armistice. During 1919 the average remained at about eleven pence, rose to over fifteen pence during the early part of 1920, and subsequently experienced the falls that disturbed the Chilean market in 1921, when the peso touched an exchange value of between six and seven pence.

Despite, or perhaps on account of, the wealth of Chile in copper ores, no coins made of this metal are actually in use, although they make an appearance in official records. The reason for this abstention is found in popular prejudice against a commonly known metal. During the sixteenth century an attempt was made to introduce copper coinage, a large quantity of the metal was minted in Santiago, and the objections of the peasantry were so strong that more than a million piastres' worth of the coins were buried or thrown into the rivers in contempt.

Employés in most of the nitrate fields receive at least a proportion of their wages in special token-money, distributed by various companies with the chief object of circumventing the underground liquor traffic. These large discs, specially tinted, and stamped with the name of the issuing oficina, pass as currency in camp stores and upon the contiguous railroads, but are without more than curio values outside the nitrate areas. Such tokens help to relieve the need for quantities of small money, for Chile, like every other land with a paper currency making conscientious efforts to reduce

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inflation, is perennially short of change in industrial regions.

Chile has in circulation about 4,000,000 pesos in silver coinage, and a Government note issue of 150,-000,000 pesos, which on the basis of eighteen pence to the gold peso is covered to the extent of 75 per cent by the Conversion Fund; at twelve pence, the issue is fully covered. But there is other paper outstanding — treasury "vales," to the amount issued to banks and nitrate producers, totalling at the beginning of 1921 about 107,000,000 pesos, as well as 45,000,000 pesos in round numbers, issued against the gold guarantee. The total paper currency of Chile is therefore over 300,000,000 pesos, or 75 pesos to each inhabitant, with one peso of silver and with a quantity of nickel: let us say, about four pounds sterling, or $20 U. S. currency.

No one is more acutely aware of the dangers of inflation than Chileans, a people with a marked aptitude for finance. That fine journalist and courageous editor, Carlos Silva Vildósola of the *Mercurio*, has repeatedly drawn public attention to important aspects of the monetary situation, and has declared that Chile is "desperately ill of the disease of paper money"; a comprehensive study of fiduciary issues has also been made by Dr. Guillermo Subercaseaux, a Chilean economic expert, and one of the planks of the Alessandri platform was a promise to proceed with the fixation of exchange, "so that we can know what we really possess, and how much we can buy tomorrow with the money we earned yesterday."

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Debts

Chile's public debt was augmented in early 1921 when $24,000,000 United States currency was borrowed in New York, but prior to this loan the exterior obligations of the country had not been heavy in comparison with its vigorous economic growth; later in the year, another $20,000,000 (U. S.) was borrowed in New York, and in the first weeks of 1922 the financial markets of London readily took up a Chilean loan of £1,657,000.

The first Chilean loan was made in 1822, after Independence, by the Supreme Director, Don Bernardo O'Higgins, through his representative in London, Don Antonio de Yrisarri. One million pounds sterling was obtained through the medium of Hullett Bros. & Co., the loan bearing interest at six per cent; a Sinking Fund of £20,000 the first year, and £10,000 in succeeding years was arranged for, any bonds remaining unredeemed in thirty years to be paid off at par. The security agreed upon was a mortgage upon all revenues of the State, estimated at 4,000,000 pesos or £800,000 annually; also specially pledged were the net revenues from the Mint and from the Diezmos or Land Tax, expected to yield 250,000 pesos annually.

Of this premier loan Peru had a share amounting to three-tenths of the total, or 1,500,000 pesos.

Successive borrowings brought Chile's exterior debt to £1,500,000 in round numbers by 1850, and £5,500,000 by 1870. Between 1876 and 1893, when the war with Peru and Bolivia had been followed by the revolution against Balmaceda, these obligations rose to nearly £12,000,000 sterling. In 1901 the account had mounted to £17,000,000, and to £23,000,000 in 1909.

Two years later external loans stood at £35,000,000,

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but were reduced to about £34,000,000 in 1913; by the middle of 1921, according to the Official Message of President Alessandri, this debt had been brought down to about £28,000,000. The detailed history of Chilé's financial years since 1884 shows new loans, although as a rule of extremely moderate sums, occurring almost annually with the exception of a gap of eight years between 1896 and 1905, when not a penny was borrowed; nor was any fresh exterior debt incurred between 1912 and 1921. Most of the Chilean loans bore the modest interest of 4½ per cent.

In 1919 Chile began to negotiate for a new loan, to cover the needs of the State railways; there was a deficit of 40,000,000 pesos upon the operation of these lines in 1918, and in addition to another large deficit, expected in 1919, money was wanted for supplies and equipment for new work upon the lines, and especially for construction on the southern part of the "Red Central." The law passed by the National Congress authorising the loan also permitted the State railroads to raise tariffs by 20 per cent. Eventually, in February, 1921, the first New York loan was made through the agency of the Guaranty Trust for $24,000,000 United States currency; it bears interest at 8 per cent, and was issued at 99, a considerable proportion of the sum raised being spent by arrangement in the United States.

Public Revenues

Public revenues in Chile are large in proportion to the population, the great bulk of the national income coming from import and export dues and, since the acquisition of Antofagasta and Tarapacá, especially from the nitrate industry, in the form of exportation taxes, and leases of deposits, as well as less directly

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from the entry of immense quantities of machinery, stores and personnel. In considering the statistics of Chilean revenues, it must be remembered that taxes are partly paid in "paper" and partly in "gold"; no gold coin, nor, necessarily, gold-backed paper actually passes, but what happens is that a proportion of the dues are paid in paper of a fluctuating exchange value, while the remainder is paid at the fixed exchange rate of eighteen pence to the peso.

Since the Chilean Government's excellent statistical departments figure out the totals reduced all together in pesos of eighteen pence, however, or in pounds sterling, the student of Chilean economics is considerably aided; but in surveying past years one is confronted with the fact that between 1885 and 1897 the peso was reckoned as being worth thirty-eight pence. For the reason, therefore, that comparisons with external currencies would frequently be misleading, it is preferable to retain the majority of revenue and trade figures in Chilean denominations only.

In 1850 Chile's national income was still below 5,000,000 pesos yearly: there was almost invariably a small balance over expenditure in these early years, and in 1865 this excess rose to the respectable figure of 6,000,000 pesos. It was not until 1868, when revenues had grown to 13,000,000 pesos, that a deficit so large as a million pesos was recorded, and this was the fourth occasion only, in 65 years, that expenses had exceeded income.

In the stormy period of the 'seventies, when expenditure on public services was heavy, and, also, railroad building was developed, deficits were common; but by 1880 receipts had risen to over 40,000,000 pesos, and a balance of nearly 13,000,000 over expenditures was left in the treasury.

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In 1891 the public revenues of Chile for the first time reached — and exceeded by 5,000,000 pesos — the hundred million mark. In 1895 receipts reached 127,-000,000 pesos, with 93,000,000 expenditure, in round numbers; next year, with an income of nearly 163,000,-000 pesos, there was a surplus of 47,000,000, an agreeable record exceeded in 1901 when, with revenues of nearly 186,000,000, the balance left in public coffers amounted to more than 50,000,000 pesos. Both receipts and surplus rose in the next year, and in 1903 official statistics showed the remarkable figures of 210,000,-000 income, with 91,000,000 on the right side of the ledger after expenses were paid. A slight drop was experienced in 1904, but in 1905 receipts went up to nearly 257,000,000 pesos, rising to 373,000,000 in 1907 and 458,000,000 in 1908. In 1911 a tremendous jump in public income was made, to 796,000,000 pesos: in this year the surplus rose to nearly 457,000,000 pesos. In the three following years there was a falling off from this satisfactory record, but the balance remaining in the treasury was always substantial, and until Chile was adversely affected by the international upheavals following the European War her treasury was in a condition that many wealthier nations might envy. But in 1919 the Government was obliged to record a deficit of over 60,000,000 paper, and in 1920 estimated a deficit of 89,000,000 paper pesos. The result of these unprecedented difficulties is to bring about a somewhat hasty series of plans for changing the tax system, with a view to obtaining larger revenues, and while heavy dues were placed upon the importation of luxuries, remodelling of the inheritance and land laws, and of the imposts upon industry and commerce was outlined. The fall of nitrate prices, and paralysation of the market, emphasised the fact that this industry is taxed to

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a disproportionate degree, while many other forms of activity are exempt. In 1915, for example, out of 134,-000,000 paper pesos received in the customs houses, 85,000,000 were paid for nitrate exports and 1,000,000 for its by-product iodine, while of the gold receipts, amounting to 30,000,000 pesos, 29,000,000 were paid for the same output from the salitre fields.

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CHAPTER XIII

CHILE'S NAVAL POSITION

Chile and the World War.—Strength of the Chilean Navy.—The Army.

THE geographical situation of Chile, giving her a strip of coast twenty-eight hundred miles long, renders her acutely interested in the future of the Pacific. Command of the Strait of Magellan and the possession of an excellent fleet are guarantees of her ability to protect this interest.

In the wide affairs of this ocean, destined apparently to be the scene for the next trials of political if not of physical strength, the nations of the South American west coast have as yet had no voice, for while it is accepted as a matter of course that certain European countries, the United States and Canada, as well as Japan, Australia and New Zealand, should insist upon having their views heard, neither Mexico nor the countries of Central and South America are generally regarded as parties to the questions involved. With the development of national consciousness and the creation of well-equipped navies, a number of these countries will figure as coadjutors of increasing importance, and in the forefront of them Chile will, I am convinced, be found, ready and able to assume her share in the working out of a common problem.

Chile was physically affected by the great war. Not only was Easter Island used as a naval base by the German fleet, but her ports were used as refuges or supply

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stations by the ships of several belligerents. German shipping lay in Chilean ports, many German sailors were interned during the war period in Chile, and although her position was a passive one it cannot be doubted that the deep interest with which she watched events in the Pacific and the Magellanic archipelagos was much more than passive. So far as the Allies were concerned, their cause would have been little, if at all, served by the entry of Chile into the conflict against the Central Powers; it was Chile herself, with a possible post-war claim upon some of the steamers of the Kosmos line lying interned during the war in her ports, who stood to gain by a belated entry, and it is to the credit of her scrupulously correct neutrality that she refrained. A distinguished Chilean writer, Dr. Enrique Rocuant, published in 1919 a comprehensive study upon "The Neutrality of Chile: the grounds that prompted and justified it." I think that no one who understood the situation, or the feeling that Chile sincerely exhibited, needed this explanation, however lucid and kindly, detailing as it does the absence of any such motive as brought Brazil, with her list of torpedoed vessels, to the Allies' side, and setting forth the equity of Chile's actions when faced by the acts of the belligerents in her territorial waters. There were, for example, violations of Chilean neutrality by various units of the German fleet at Easter Island and the Port of Papudo as well as in Cumberland Bay (Juan Fernandez); against these violations Chile vigorously protested; when the British *Glasgow* followed the *Dresden*, escaped from the battle of the Falklands into Cumberland Bay, found that vessel with flags flying and guns pointed and promptly sank her, Chile made similar forcible protests. But she accepted the British regrets and offer of satisfaction with very ready graciousness.

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Two years after the close of the great war Chile became, as a direct result of her old and cordial relations with the British navy, in an unprecedentedly strong naval condition.

Strength of the Chilean Navy

In August, 1914, two dreadnoughts were building at Elswick for the Chilean Government, the *Almirante Latorre* and the *Almirante Cochrane*, the price of each vessel being £2,800,000. A number of fast destroyers, also constructed by the Armstrong Whitworth Company, formed part of the Chilean naval developments, two of these, the *Lynch* and the *Condell*, being already in Pacific waters when hostilities broke out. The dreadnought *Almirante Latorre* was completed speedily, taken over for British Government service, and did good work under the name of H.M.S. *Canada* during the four and a half years of the conflict; in April, 1920, she was repurchased by the Chilean Government, which obtained for the comparatively modest sum of £1,400,000 not only this fine vessel but three more destroyers, sister ships of the *Lynch* (the *Williams Rebolledo*, *Simpson* and *Uribe*) and a naval tug. About the same time the British Government also presented to Chile six submarines and fifty aircraft, a gift associated with British appreciation of the sympathetic attitude of Chile at the time when the exigencies of war brought about detention of the vessels under construction.

The dreadnought *Latorre* displaces 28,000 tons, has a length of 125 feet, beam of 92 feet, and draws 28 feet of water. She carries 30 guns of 14 inches, 3 inches and 4 inches, as well as a number of machine-guns and four torpedo tubes. Her speed is 23 knots, and her full crew 1075 men. She burns coal and has a bunker capacity

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of 1200 tons. The five new destroyers each displace 1850 tons, are 320 feet long, are armed with six 4-inch guns, and have a speed of over 31 knots; bunker capacity, 507 tons of coal; crew, 176. These vessels were laid down in accord with the plans created for the modernisation of the Chilean fleet in 1910, and their incorporation into the navy of Chile renders this country the possessor of an excellent fighting squadron, equipped in consonance with the experiences of the great war.

The possession of good modern vessels of war is one thing; adequate operation of them is quite another, as more than one young nation has discovered to her cost. In Chile, however, a traditional naval feeling has existed for a century, aided by the inheritance of a considerable proportion of blood from British seamen, and the work of a group of British naval instructors who were mainly responsible for efficient development in the service — as the German military instructors moulded at least the exterior of the army in the years before the war.

When I had the pleasure of visiting Chilean naval vessels in Talcahuano in 1920 at the invitation of the genial Admiral Fontaine, it was difficult to realise that the sturdy and well-groomed young officers, many of them bearers of British names, clad in replicas of the British uniform, were going to a foreign country when they set out, a few days later, to fetch back from Britain the new Chilean ships of war.

The Chilean fleet in early 1922 consisted of two battleships, the French-built *Prat* (acquired 1890), with a war strength of 466 men, and the British-built *Latorre* (1913–20) carrying about 1100 crew; the two armoured cruisers, the *O'Higgins* and the *Esmeralda*, were constructed at Elswick in 1897, carrying nearly

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600 men each; three cruisers of another type, the *Blanco*, *Chacabuco* and *Zenteno*, were built in the same yards following the acquisition in 1890 of the French-built *Errazuriz*. In addition to these large vessels, Chile has two torpedo cruisers built by Laird in 1890; the *Tomé* and *Talcahuano;* five modern destroyers (flotilla leaders) constructed between 1912 and 1914; seven older destroyers (the *Thompson*, *O'Brien*, *Jarpa Gamero*, *Orella*, *Riquelme* and *Serrano*, carrying 88 men each) built at Laird's; five torpedo-boats (*Contreras*, *Hyatt*, *Mutilla*, *Rodrigue* and *Videla*) built in 1896 in the Yarrow yards, carrying 36 men each, war strength; the six new submarines referred to above, built by the Electric Boat Company, Ltd., in 1915, needing a total war strength of 108 men; one training ship, the *General Baquedano*, built at Elswick in 1898, a schooner with auxiliary engines, carrying 253 men; three transports, the *Rancagua*, *Maipo* and *Angamos*, with a complement of 86 men each; one sailing ship, the *Lautaro*, built in Glasgow in 1896; ten patrol boats, of which six older vessels were built on the Seine between 1890 and 1905, while four boats acquired in 1919 were built in Helsingfors. There is also still upon the list an old ironclad, the ex-*Cochrane*, built at Elswick in 1875, carrying a crew of 132 men.

Chile reckons the peace strength of her navy afloat and ashore at 8377 men, while the naval expenses amount to about 14,000,000 Chilean pesos; in war times the personnel would be increased by 1020 men, costs being brought up to 15,200,000 pesos. Naval reserves are calculated as 35 per cent over the war footing, as regards personnel, while in the event of hostilities aid of great practical value exists in the steamers of the Government-controlled Compañia Sud-Americana, transformable into auxiliary cruisers.

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A certain number of men are annually recruited compulsorily for one year's service, but as these conscripts only amount to three or four hundred, the naval forces are chiefly made up of volunteers who enlist for three to ten years; many conscripts after serving their initial year elect to remain under this system. In a maritime country such as Chile seamanship is popular, and the navy never has difficulty in filling the lists with young men who are developed rapidly into smart and well-disciplined sailors. The naval schools of Chile are adequate and well equipped: in Valparaiso is a fine establishment training 200 cadets, of whom 20 to 30 are annually passed as junior naval officers; the Naval Academy, part of the same building, trains twelve higher rank officers. Also in Valparaiso is the Navigation School, passing about six officers yearly, and the School of Mechanics training 120 pupils is supplying yearly 30 to 40 petty officers. Cadets of the Naval School receive a second-class midshipman's certificate after five years' instruction, and are then sent to the *Baquedano* for advanced technical training and a 2000-mile sailing trip, before the first-class certificate is granted. It is significant of Chile's high repute as a trainer of young sailors that cadets from several other South American countries are to be seen in Chilean naval schools.

Besides the Valparaiso establishments, Talcahuano has a Mechanical School for naval engineers, with 200 cadets in training; here also young officers obtain instruction in torpedo work and radiotelegraphy; this school turns out about 120 seamen, 30 wireless operators, and 20 midshipmen, as well as qualifying an average of 10 officers. On board the ex-*Cochrane* is a gunnery school, training 120 men every year; on the sailing-ship *Lautaro* is a school for training pilots of the Chilean

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merchant marine, as well as for the navy; the corvette *Abtao* is used as a training school for boys, and here 150 lads are prepared yearly, with the obligation of serving five years in the navy. The *Baquedano* corvette receives boys from the *Abtao* and midshipmen qualified from the Valparaiso school for a year's voyage of instruction before they assume duty in the regular service.

Chile has four naval bases, at Arica, Valparaiso, Talcahuano, and Punta Arenas; the latter has none but mobile defences, since the Treaty made with Argentina at the time when boundary limits were settled stipulates that the Strait of Magellan shall not be fortified, a decision which will probably be modified in view of Chile's undoubted right to protect the property and lives of her nationals in the rapidly developing district of Punta Arenas and a number of inlets and islands. No belligerent or other vessel would be prevented by Chilean fortifications from passing from Pacific to Atlantic waters or *vice-versa*, since the Cape Horn route offers open waters.

The Hydrographic Bureau attached to the Chilean navy has been responsible since its inception in 1874 for constant exploration and surveying work directed to all parts of the coast, but particularly to the intricate waterways of the south. Over 150 maps and charts have been published by this Bureau, constantly in communication with the equivalent services in the most advanced countries.

The three first-named naval bases possess fixed land defences, as well as movable and submarine defences; at the chief station, Talcahuano, are two dry docks, one of 45,000 tons and the older of 15,000 tons capacity, as well as a floating dock of 1200 tons. Arrangements are also made with private dockowners in Mejillones (Antofagasta) and Valparaiso for repairs when needed,

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the shipyards of Punta Arenas, Chiloé, Valdivia, and Constitución also offering useful help both as regards construction and repair work. In point of numerical strength, the Chilean navy is second only to that of Brazil, while as a matter of fighting record this service has been conspicuously successful on the three occasions when Chile has been at war during the last hundred years. Her history is firmly bound to her maritime tradition, and her political influence in the future will undoubtedly be considerably affected by her vigorous command of the sea.

The army of Chile is a citizen army; its strength, year by year, is under 20,000 men, of whom about half are newly conscripted; but every healthy man over twenty-one years old is due to receive a year's training, and is as a matter of fact very rapidly made into good fighting material. I have seen extemely smart soldiers turned out in six months' time in the training camps of Chile.

There is no doubt that in case of need the country could raise and equip a hundred thousand men at least partly trained to arms in a few weeks' time. Discipline is good, the uniform neat, weapons of modern pattern and well-kept. The cavalry is conspicuous for first-class condition in particular; horses and horsemanship are of a remarkably high quality.

The aircraft branch of Chile's service is being steadily developed; the daring and skill of the Chilean aviator was displayed when Lieutenant Godoy crossed the Andes into the Argentine — the pioneer to perform this hazardous feat.

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CHAPTER XIV

IMMIGRATION

The First Immigrants of the South. — Araucanian Lands.

ORGANISED immigration efforts began in Chile just before the middle of the nineteenth century, during the régime of President Bulnes; they ceased within a few years, and recommenced between 1881 and the end of the century: thenceforth the flow has been regulated by a series of laws of strict tendencies. For a number of years the largest contributor of blood to Chile has been Spain, but there are no colonies such as those created by the Brazilian system, newcomers of today usually finding industrial employment in cities, or the coal, nitrate and copper camps. For several years before 1914, when immigration practically ceased, the average entry was less than 2000, of whom at least 75 per cent were Spaniards. Chile's first batch of regular immigrants arrived in 1850, following the efforts of an energetic agent in Europe. There were 70 German men, 10 women and 5 children in the party, who sailed round the Horn, had a passage of 120 days and were landed at Corral. Both Valdivia and Corral were economically dead at this period; it would perhaps be more exact to say that they had never lived. The sea-port and the riverine city had been maintained as frontier posts against pirates on the ocean and Indians on land during the Spanish colonial days; a small mixed population had grown up as a result of Valdivia's utilisation as a dumping-ground for convicts from all the West Coast. Evildoers were shipped here as a convenient means of obliteration, and a number never returned north. For

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thirty years following independence from Spain Valdivia languished, the forts decaying and the soldiers indifferent. There was no connection with the rest of Chile except by sea, for the land of the unsubdued Araucanians lay, a broad belt of forbidden land, below the populous towns of the Central region.

Corral had twenty-eight houses when the Germans landed; Valdivia's plaza was a rubbish-heap, the streets unmade, the one-story houses of mud had unglazed windows. To add to the troubles of the agent who had brought the settlers, governmental negotiations for land on which to plant the colony had not been completed. Vicente Perez Rosales, the agent, tells in his memoirs that as soon as immigration to the south loomed in view as a fact, tracts of land that had been wild and valueless suddenly acquired owners and a price. Enterprising citizens went forth into the woods, found some ancient Indian who was willing for a consideration to swear that such and such a tract was his inheritance from his fathers, and, for another consideration, to sell it.

Vicente Perez found it an extremely difficult matter to fight this new flood of landowners, and had no time to spend upon litigation; so, philosophically, he adopted similar methods, and presently acquired territory. But meanwhile provision had been made for the first arrivals by the public spirit of Benjamin Viel, a French citizen of Valdivia, who gave for their settlement the pretty Isla de la Teja which lies at the confluence of the Calle-Calle and the Cruces rivers in front of Valdivia City. Today the island is covered with prosperous businesses, most of them carrying German names — breweries, a paper mill, two or three shipbuilding yards.

The agent then went to look for interior land for the next batches of colonists, and, finding that forest

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Valdivia, a Flourishing New Southern City.
Punta Arenas, the Southernmost City in the World.
Puerto Varas, facing Calbuco Volcano, Lake Llanquihue.

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country was unclaimed, started to explore what was still virgin country to the white man. He lived on honey and wild nuts, struggled through dense woodland to the edge of Lake Llanquihue, chose his ground, and then gave his chief Indian scout, the celebrated Pichi-Juan, thirty pesos to burn clearings through the heart of the forest. It was this Indian who brought the first fifty yoke of oxen to the borders of the Gulf of Reloncaví, driving them through the jungle from Osorno and opening the first track.

Pichi-Juan took three months to burn a belt five leagues wide, and fifteen leagues long, through the Osorno Valley, leaving isolated woods to serve for house-material and fuel. Puerto Montt, at Melipillo, was founded in February, 1853, among blackened stumps, and the new colony, also of Germans, had two bad winters when the crops rotted in the ground; but by 1861 had progressed so well that the town was made the head of the province.

One hundred and five more settlers had come in 1852; another batch four years later. By 1858 Puerto Montt was self-supporting, with cultivated fields, flour mills, and was exporting brandy and honey, planks, tanned leather and wheat flour. Between the foundation of the settlement and 1864, when immigration of German familes ceased, 1363 people had entered. Henceforth the opened territory received continual additions of energetic people from many parts of the world, Chileans themselves went south, and today there is no better developed and managed part of Chile.

Araucanian Lands

A new spurt of immigration occurred after 1881, when the Mapoche Indians' obstinately held claim to

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sovereignty over the broad belt of lands known as Araucania was finally destroyed by the republican forces of Chile. With the frontier barrier overthrown, farming lands lay open, and the Government made a fresh bid for European settlers.

Agents were sent out to Switzerland, France, England and Germany, and prospective colonists were offered 40 hectares of land (about 100 acres) in some regions; in others, twice this amount; part of the passage-money was given, a yoke of oxen, seeds, implements, materials for house-construction, and a cash advance towards the expenses of the first year. Against these advances was set off a mortgage upon the property, to be repaid in three years.

By the year 1884 a French-Swiss colony had been established at Quechereguas, and another at Traiguen, fifteen miles distant. In the same region, at Victoria, were Germans and Swiss; French settlements had been made at Quina, Angol and San Bernardo, while in the Temuco region were more Swiss colonies, as also at Quillen, Puren, Galvarino, Contulmo and Ercilla. Between 1881 and 1887 the European newcomers had invested 8000 francs (the Chilean peso being then worth five francs) in land, and the colonists in Araucania numbered about 4000.

Their early life had its difficulties. When railways began construction through the long-secluded territory the Indians became infuriated, and the unfortunate colonists suffered from repeated raids. Property was destroyed and settlers attacked and killed when the Angol-Traiguen section of the line was commenced, and eventually a special police force was established to protect the new settlements. The Swiss Government made investigations through their consulate in Valparaiso, raising certain points in connection with the

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well-being of the Swiss immigrants, their physical security, and delay in obtaining land titles, and, although the Chilean authorities did their best to ameliorate conditions, a check to the invitation extended was felt for a time. However, the young towns began to prosper, the Chilean Government planned and began more railways, and before the end of the century the whole territory had been tentatively opened. Cultivated fields spread over the face of the old Indian reserve, joining eventually with the Valdivia and Llanquihue lands settled thirty years previously.

Two small specialised groups of immigrants are to be seen in the south in addition to the German and Swiss wave. After the last Boer War, a number of farmers came from South Africa with their families, and settled upon the Island of Chiloé. Here the fair-haired children of the Boer folk thrive, the farms are neat and well kept, and the properties, many of them extending to the sea's edge, appear to flourish. The other transplantation is that of a group of Canary Islanders, a hardy folk who have acquired land on the beautiful Budi Lagoon, on the coast of Cautín Province. In the southern provinces below the Bio-Bio, however, the long existence of the Spanish outposts next door to Indian populations had its effect upon both groups. The Indians learned quickly to adopt the European habit of keeping domestic animals — they are said to have owned 50,000 sheep by 1567 — and to till the soil; the Spaniards or their descendants of mixed blood learned to live contentedly in houses of mud bricks, to eat Indian food and to prepare it in the Indian manner. The southern tribes had no domestic cooking vessels: holes in the soil, beaten hard and lined with stones, were heated with wood fires, and the food, thickly wrapped in leaves, was placed in a red-hot

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cavity and covered down with branches: all kinds of food together — shell-fish, birds, green vegetables, potatoes — were put in, the whole coming out as an appetising, steaming mass. This *curanto* was adopted by the mestizos, and still survives in certain localities as a favourite dish, exactly as the old Peruvian *locro*, the potato stew of Inca days, is still an indispensable item of the menu of upland West Coast towns today.

Neither coffee nor tea were to be had in the south in early days; the former in fact had not yet come into general European use, while the import of tea was forbidden under the Spanish colonial régime; the mestizos took to a drink made of ground and parched maize mixed with water, or chicha, or the infusion of yerba maté, imported overland from Paraguay. The latter custom still survives in country regions, while the colonists from Central Europe of last century filled their need for coffee with a decoction of dried, burnt and ground figs. The use of the woollen poncho, a garment excellently adapted to the climate, has long been general amongst the farming classes or any others spending much time out of doors and, especially, in the saddle.

Captain Allen Gardiner, in Chile between 1814 and 1838, observed that in the south a spade was used by the Chilenos which was a copy of the Indian implement, made of a horse's blade-bone lashed to a four-foot-long pole; that thread was spun by hand without a wheel, and cloth woven upon the "very rudest description of a loom"; and that the descendants of both races built their ranchos of an oval shape, with mud floors, wattled sides, no windows, an interior row of supporting posts, and a roof with openings at each end of a raised ridge-coping; the fire was built in the middle of the floor.

Material comforts brought by contact with the world, and prosperity resulting from access to markets, trans-

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formed the mode of life after the arrival of colonists, the advent of the railway, and the commencement of steamship services. When flowers began to be seen in the window-spaces of southern houses in place of iron grilles, as Vicente Perez Rosales says, it was the signal of a new standard.

Formal colonisation in Chile is today little needed, but there is a constant informal inflow of white foreigners of good standing who in a considerable proportion marry the charming Chilean women and are added to the permanent population. No great wide spaces are undeveloped, and the natural increase of a healthy land will suffice for industrial needs.

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CHAPTER XV

CHILEAN LITERATURE

Conditions of Authorship. — *Historians.* — *Politicians, Engineers and Novelists.* — *The Society Novel.* — *Realistic School.* — *Poets.*

CONDITIONS of authorship in Chile are not altogether encouraging to the writer of books. The journalist has a fair chance, for in this as in almost every Latin-American country where prosperity is at least recurrent, there is a large output of daily and weekly papers; if the publishers are unable to offer any great financial reward to talent, they are keenly sympathetic, and the writer of light or learned essays is eagerly welcomed and rapidly renowned. But publishers of books, as developed in Europe, are unknown in the Americas south of the Rio Grande. Therefore the author of distinction or wealth frequently takes his manuscripts to Paris or Madrid, where he seeks a professional publisher to issue his work, and although he may share in the expenses of publication he is consoled by the assurance of expert distribution.

The way of the author publishing in Chile is harder. He goes to a printer with his book, makes a personal contract, pays the bill, and then has to market his wares. Any advertising is performed at his own expense and he must depend for sales upon the local bookstores. He is secure of receiving encouraging reviews in the local press, unless he has become unpopular

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in any particular quarter for, perhaps, political reasons, and the bookstores always seem proud to display the groups of "autores chilenos" upon their shelves. But, in the case of a serious, non-fiction book, the author rarely prints more than 200 copies, and thinks himself lucky if he sells 50. A novelist who has already achieved something of a name probably prints 500 copies and may reasonably expect to sell half that number.

The lack of professional publishers all over Spanish America appears to be due chiefly to mental dependence upon other countries and particularly upon France. By far the greater proportion of books offered for sale in any Spanish-American town is French, or translations into Spanish of French books, the list ranging from such classics as the works of Voltaire, Rousseau and Nordau to Zola, Dumas, Anatole France, Guy de Maupassant and the more modern writers of fiction. Conan Doyle's detective tales still sell freely in Latin America, as do the works of Scott, Kipling, Rider Haggard, Hardy, and a few other "standard" English authors, in Spanish translations some of which are not so much incredibly bad as extraordinary misfits. The oddest translation of this kind that I have ever picked up from a Latin-American bookstall was of Sudermann's "Mill." I found it on a forlorn newstand in interior Nicaragua, and kept it as a shining example of the difficulty of translating into a Latin from a Teutonic tongue. Neither the speech of the German peasants, the routine of the mill, the ideas or scenery "went" in Spanish, and it is at least partly because a French story translates so happily that Latin America is flooded with French literature. All these translations are made in Europe, and are generally published in Madrid; as a result, Latin America reads, in the main, what Spain reads.

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Under these circumstances it is admirable that the slender stream of Chilean literature persists. Examining the output, one concludes there are today two main classes of producers: first, the authors who are true artists, pricked by the age-old necessity for writing, and secondly the propagandists who for the sake of public service, or political reasons, wish to present their views. In the delicate mid-shades one finds the genuine historian; the personage whose aim is to achieve a literary reputation; and the sound economic essayist.

As regards history Chile has been well served by her own sons. The bright spirit of Benjamin Vicuña Mackenna, descendant of one of the distinguished Irish settlers in Chile, informs his "History of Chile," while excellent work was also done by Barros Arana in his monumental record. It would be difficult to exaggerate the value of another series of productions by José Toribio Medina. This delver into archives has been producing for many years the result of tireless and critical work, the books being printed "en casa del autor" (in the author's house). His series of "Documentos ineditos para la Historia de Chile" run to twenty volumes; we are also indebted to him for a detailed and fully documented account of the Inquisition in Chile, in addition to similar works dealing with the Inquisition in Peru and Mexico. He is, in fact, one of the most indefatigable workers in the Latin-American field of history. Among other living historians of Chile is Dr. Domingo Amunátegui Solar, Rector of the University of Chile, while Chilean geography owes much to Don Ernesto Greve, head of the Geographical Board in the Public Works Department in Santiago and to the devoted work of Dr. J. G. Guerra.

Of political monographs, Chile has sufficient writers

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of this class of work coming from the ranks of journalists as well as from those of the professional politician; a glance at a pile of such pamphlets leads inevitably to the conclusion that only a small proportion can possibly be disposed of by sales. But among the political writers whose essays are frequently of wider interest is the author of "The Neutrality of Chile," Enrique Rocuant.

The distinguished engineer, Santiago Marín Vicuña, is one of the best Chilean writers upon economic subjects, his range covering railways, mines, irrigation, ports, canals, etc. The press of the excellent *Mercurio* of Santiago reprints in book form many of these and kindred articles of national concern, performing sound work in bringing the acute problems of the country before the public, never more needed than in republics where continuity of domestic as well as foreign policies is often lacking.

In the realm of fiction it cannot be said that Chile is rich. She has never yet produced a great novel. But there is consolation in the fact that neither have most of her sister states, the greatest wealth of literature, particularly of the genuinely national school, flowering in Portuguese and not Spanish America; the novels, belles lettres, historical studies and poetry of Brazil have been and are poured forth in quantities that are torrential compared with the thin streams from many other Latin-American countries. The fact is curious when one considers the present strength of Spanish literature compared with that of Portugal. It would be unfair to Spanish America if one did not seek an explanation of her attenuated literary production on other grounds than those of mental capacity, and unfair to Chile if her output were not considered in relation to that of all other parts of Spanish America.

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Spanish America during the major part of the nineteenth century underwent constant political upheavals resulting in the preoccupation of the most brilliant men with presidential disputes and, not infrequently, the exile of the most active citizens from a share in their country's advancement and ideas. Behind the former Spanish colonies lay, also, a traditional acceptance of formalities and inhibitions that were far from encouraging to intellectual development.

Nevertheless, here and there rose bright founts of literary production during last century. It is not surprising that the best of these originated in the regions where the viceregal courts had been established for three hundred years, where the Royal Audiences and universities had been set up and a nucleus of well-educated people settled. The best-known novel of South America (aside from Taunay's famous "Innocencia"), the sentimental "Maria" of Jorge Isaacs, is not a case in point, however, for the author, writing in proud and intellectual Colombia, was the son of an English Jew.

But amongst the shining examples to be found is the list of novels put out by José Milla in Guatemala, and the work of Ricardo Palma in Lima. Milla, an indefatigable worker of fine intellectual training, put most of his romantic-historical novels into a colonial setting, and enjoyed a great local vogue, while the "Tradiciones de Peru," although purporting to be legendary rather than fiction, strikes a somewhat similar note.

Chilean literature has not developed along like lines. Here the development of the novel was chiefly based upon the internal political struggles of the country during the later part of the nineteenth century, and, with such themes as that of the revolution against Bal-

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maceda fading from public interest, the military-patriotic story has yielded to two chief classes, the society novel and pictures of the life of Chilean peasants and workmen.

The former are not infrequently of an insufferable length and insipidity; the scene is nearly always confined to Santiago, and the author devotes half his pages to minute descriptions of the heroine's costumes, while the rest of the space is taken up with endless discussions about *amor*. For instance, in the highly reputed "Martin Rivas" of the late Alberto Blest Gana, one of the most polished and admired Chilean novelists, it is impossible to discover why Edelmira, Leonor, Adelaide, or Matilde should "love" or dislike Martin, Agustin, Rafael, Emilio, or Clemente; not only is all the conversation of the young people based upon the question of whether someone does or does not cherish a heart-affair, but all the fathers, mothers, uncles and brothers are represented as perpetually running about suggesting that their sons, daughters, sisters, etc., should enter into matrimony. The high principles of the virtuous Martin do not prevent him from suborning a soldier and police official in order to escape from jail, but his worst crime in the eyes of the reader is likely to be his interminable letters of loquacious sentimentality, which unfortunately set as well as followed a fashion. "Los Transplantados," displaying the Chilean who elects to live out of Chile, is generally placed second in popularity. This novel and "Martin Rivas" were imitated in a trickling stream of politico-social-amatory novels, of which perhaps the best-known late successor is Luis Orrego Luco's "Al Traves de la Tempestad," in two thick volumes whose pages, devoted as they are to unctuous accounts of the heroine's feathers and embroidered dresses, are relieved by

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occasional strokes of interesting political portraiture of thirty years ago.

By far the most interesting and vivid fiction of today is that of the realistic school, dealing with the Chilean workman, bandit, etc. The methods of Blasco Ibañez inspire much of this output, and it frequently happens that in order to achieve an appearance of strength the author descends to a sordid brutality that is apt to defeat its own ends. We don't believe it. This murdering, lying, callous drunkard is not a typical Chileno, says anyone who knows Chileans, and we begin to suspect the novelist of cultivating misery in the first place because he thinks it makes his work strong and secondly because he really has not studied the Chilean working-class very thoroughly, and trusts that his readers are equally unaware. An example of this class is "El Roto," by Joaquin Edwards, published in the middle of 1920. "El Roto" followed the work of several other writers dealing with the life of the *campesinos* (countryfolk), miners, *huasos* (cowboys), etc., of Chile. Baldomero Lillo is perhaps the most lucid, restrained and sympathetic of the members of this school, and his "Sub-Terra" is a stronger collection of short stories than those of "Sub-Sole." Lillo is the avowed friend of the poor and simple; his miners and beggars are invariably wronged, and the bailiff or foreman the wicked aggressor. His most successful tales are pitched in a minor key, a tragedy the inevitable conclusion; but his delicacy of expression, admirable sincerity and brevity, and the plain fact that he knows the life of which he writes, single him out from the brutal-realistic stream. Lillo worked in the coal-mines of Lota in his youth, was afterwards an employé in a store in Lebu, and did not begin to write until years afterwards he came to Santiago and joined the band of

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young Chilean writers that included his distinguished brother, the poet Samuel Lillo. Don Baldomero is not a fertile producer, but his work is of steady quality. Another portrayer of virtuous *campesinos* is Federico Gana, whose "Días de Campo" is a pleasant, smoothly written series of scenes. In quite another manner are the stories of Mariano Latorre, whose most striking volumes are "Cuentos del Maule" and "Cuna de Cóndores." Latorre's background in the latter tales is the Chilean cordillera, a region plainly well known to him; he has a gift for incisive description, and if his characters are frequently insensible, melancholy and animal, they are at least rarely sentimental. Don Pedro Cruz, a well-known Chilean critic, has criticised Latorre for playing to the gallery with his sententious insistence upon the characteristics of the Chilean race as displayed by his rather morbid peasantry, and, speaking in general of the school to which Latorre belongs, declares: "We are tired of the idiocies of Peiro, the brutalities of Goyo, the sensuality of Florinda, the cunning of Ermelinda, although all this is presented to us with a mixture of dawns, sunsets, trees, brooks and fragrant breezes," and roundly charges the authors with lack of imagination and inadequate study of their own environment; the gross peasantry shown in these stories is not, he says, genuinely Chilean, as it pretends to be: "Character consists in a mode of thinking and feeling, and these writers seek the national character in precisely those individuals who think and feel the least."

Among the minor writers of fiction are Augusto Thompson, Fernando Santiván, Diego Dublé Urrutia, Egidio Poblete, Rafael Maluenda and Francisco Zapata Lillo, most of them writers of short stories and delicate sketches rather than of profound studies. A tendency towards decision of style and condensation of expression

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has undoubtedly made itself felt during the last decade, and the scores of facile pens in Chile promise the development of the national novel.

Amongst the most interesting recent work is the output of a group of Chilean women writers. The charming "Tierra Virgen" of Señora Echeverria y Larrain ("Iris") describing the southern lakes and woods of Chile, is a cameo of literature, while the work of two younger writers, Laura Jorquera ("Aura") and Elvira Santa Cruz ("Roxane") is sincere and of remarkable promise. The former writer's "Tierras Rojas," a tale of life in the high copper plains of Antofagasta, is a genuine picture and her "En Busca de un Ideal" a pleasant love story. Elvira Santa Cruz has, I think, done nothing better than her "Flor Silvestre," with its presentation of life in the Chilean countryside.

Drama has received a number of Chilean contributions, although it is but rarely that the visitor to Chile has the opportunity of seeing a Chilean play. Acevedo Hernández, Videla y Raveau, Armando Monk, and Rafael Maluenda have all written plays of merit. But while playhouses are chiefly filled with foreign companies acting foreign plays, the Chilean author has little to stimulate his talent.

Like every other Latin-American country, Chile claims a large number of delightful versifiers. A sense of melody and love of sweet words is part of the Latin inheritance, and development of sentiment is encouraged by the fine climate, physical beauty and spring of life found in such happy regions as Chile. The musical quality of the Spanish tongue lends itself to the expression of emotion, and no shame is felt in fervid outbursts; environment and vehicle combine to encourage the poet of South America.

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There has been for half a century a considerable group of young poets in Chile, many of whom turn in later life to politics, journalism or another profession; the residuum of mature poets is small. But this is not because Chile is an unkindly host to the poet: on the contrary, she is a genial foster mother. The world does not forget that the greatest of Latin-American writers of noble verse, Rubén Darío, although a Nicaraguan-born, found here his first literary encouragement, and that the electrifying "Azul" was published in 1888 in Santiago. Darío was at the time a weigher in the Custom house at Valparaiso, and Armando Donoso says, in his Anthology of Contemporary Chilean Poets, that he was no doubt a very poor weigher. At least, however, he was immediately recognised as a great poet, and it was Chilean appreciation that set his feet upon the triumphal path that he trod until his death. As kindly was Chilean nurture of the genius of another exile, the Venezuelan poet Andres Bello.

Following Darío's shining wake, a cluster of Chilean verse-makers began to publish in the early 90's: the beginning of the new century showed a growing list as the work of young Chileans. Included in these early volumes is the "Ritmos" of Pedro Antonio González; "Versos y Poemas," by Gustave Valledor Sánchez; "Esmaltines," Francisco Contreras; "Campo Lirico," Antonio Borquez Solar; "Brumas," Miguel Recuant; "Del Mar á la Montana," Diego Dublé Urrutia; and "Matices," by Manuel Magallanes Moure, who has since greatly added to his early laurels. Recently a selection of his poems, "Floreligio," was published by J. Garcia Monje in Costa Rica, that stronghold of Latin-American literature. Magallanes Moure is an excellent painter as well as a poet of the front rank in Chile.

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Striking a less contemplative and minor note than Moure, the distinguished Pro-Rector of Santiago University, Samuel Lillo, is one of the most admired poets. His "Canciones de Arauco" has a good deal in common with the verse of Brazilian "Indianism," and the "Canto Lirico," "Chile Heroico," "La Escolta de la Bandera" and the poem to Vasco Nuñez de Balboa, strike a patriotic note. No poems, perhaps, are more widely known in Chile than those of the singer Carlos Pezoa Veliz, dead in his promising youth; and other well-loved verse is that of Victor Domingo Silva.

Again in the realm of poesy the Chilean woman has a high place. The brilliant lady who hides her identity under the pseudonym of Gabriela Mistral is not only a poet but an authority upon literature: a few years ago she was awarded the Nobel prize for literature in partnership with the Spanish dramatist Echegaray.

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CHAPTER XVI

NATIVE RACES OF CHILE

Inca Control. — Racial Divisions. — The Southern Tribes. — Araucanians. — Race Mixture. — Archæology.

BEFORE the coming of the Spaniards to Chile, an important line of division already lay between the native folk who accepted the domination of the Inca and those who successfully resisted his rule. The physical sign of that division was the Maule River.

But both north and south of the Maule the various tribes differed widely in blood, in speech and habits and in capacity for the adoption of alien culture. Divergence of a marked character must have existed for a long time between the primitive, fish-eating coast-dwellers and the people living in the great longitudinal valley, who, although they were in all probability originally hunters, had taken to the cultivation of such food staples as maize and potatoes. The coast dwellers were not all of the same race, although necessity induced somewhat similar living habits: T. A. Joyce shows that upon the strip between Arica and the Atacama desert were a colony of the Uros, whose real home was on the Desaguadero River leading south from Lake Titicaca, but who were planted on the Pacific littoral in accordance with the Inca system of transferring tribes. South of these groups were the wood and skin huts of another colony brought from

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Bolivia, the *mitimaes* of the Charca tribe, who buried their dead in a contracted position. South of Tarapacá were groups known collectively as Changos, living the same simple life but practising extended burial. The practical, industrious system of the Incas could do little with such folk except, probably, to levy a tribute of fish, and chief attention was turned to the fertile country of the central valley. Here agricultural life seems to have been forced upon certain regions through scarcity of game, for although guanacos, birds and a few small edible animals are found all the way from Coquimbo to Cape Horn, such creatures as the pudu and the huemul (small and larger deer) are found only in forestal belts. South America has never possessed any great quantity of large game animals, and Chile in particular has a surprisingly short list of indigenous quadrupeds, although she has always been well stocked with both land and sea birds.

Today the "Indian" has practically disappeared from the major part of the coast and from the beautiful central valley of Chile. The 50,000 Araucanians who survive in the Temuco region (Province of Cautín) do not retain more than dwindling traces of their former customs; in the deep forestral area of Valdivia and Llanquihue, as for instance upon the island in Lake Ranco with its group of "Huilliches," a few people are found under conditions still approximating to their pre-Spanish state. But in the extreme south where the freezing water-mazes of the storm-swept archipelagos have tempted few newcomers, the native groups of Yahgans and Onas and Alakalufs are living in much the same manner as that described by observers three or four hundred years ago. Here and there, as near the newly developed farms of Tierra del Fuego, where the native folk have learnt herding, habits

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have been definitely changed, but in the main the folk of the Magellanic regions have been left in undisputed possession. The natural conditions under which they exist are not conducive to cultural development. The daily struggle for food absorbs all effort, and it is only when an outside civilisation armed with tools and machinery and modern economic knowledge has imposed its will that the effects of the inclement climate have been conquered. Despite missionary effort, the southerly native people, among the most primitive and most miserable tribes in the world, sharing the common fate of their happier kin of the pleasant lands to the north, have almost disappeared. Today the traveller traversing by local steamer the wonderful Smyth's Channel and nearby inlets and fjords may see, as the earliest travellers saw, the open canoe of the "Indians" with a wood fire burning continually upon a tiny hearth of clay, paddled through the chilly waterways by folk whose dark skins are practically unprotected from the wind and rain. The Fuegians meet any passing vessel to beg for clothes and food as they begged from the *Beagle*, but contact with newcomers has taught them nothing but a new list of small demands. In the developing life of Chile they seem to have no place.

To discover the true racial differences between the native inhabitants of Chile before the Spanish conquest is a task requiring more evidence than lies as yet before us. It is rendered more difficult by the absence of temples or permanent dwellings and by the comparatively small witness yielded by graves. Only in the north, in the dry belt, are cemeteries offering a considerable bulk of remains; here are such sites as Calama and Pucara, near Chiu-Chiu, where Inca influence is plain although the residents had certainly attained to no more than a modest cultural status. The pottery found in the ceme-

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teries of Arica and the Antofagasta sites is rough and simple; the weaving coarse. The houses were mere quadrangles of cemented rubble where, as at Pucara, ruins survive in the rainless country. These are, however, beyond ancient Chile. Nothing so advanced as this proof of settled communities is found south of Copiapó, and seekers must fain rely upon the evidence of shell-heaps and arrowheads, plus the records of early visitors and such help as is afforded by the life of indigenous folk surviving today.

The names of tribes as recorded or in use are not racial. The cloud of these appellations confuses the enquirer until he realises that Araucana is a Spanish derivative of the Quechua "Auca" or rebel; that Picunche means simply "People of the North" as Huilliche means "People of the South"; Puelche, "People of the East," and Moluche, "of the West," while the name Mapoche or Mapuche indifferently exchanged for Araucanian today is a local term indicating inhabitants of a certain territory. Joyce considers that the evidence proves existence of an agricultural folk in Central Chile before the Inca conquest, speakers of the Araucanian tongue prevailing from Atacama to Chiloé. Upon these people of sedentary habits had descended a wave of nomads from over the Andes, Pampa-bred hunters who as in many allied cases adopted the speech of the invaded land. The speech of the rebels or Aucaes survived Inca control following the invasion from Peru about the middle of the fifteenth century. Of the tribes found by the Spaniards a century later, the most northerly Araucanian-speakers were the Picunche, a mixture of Pampa immigrants with remnants of the old "rebel" stock, the latter predominating; the Moluches, farther south, showed signs of descending in the main from the Pampa invaders, although among them were

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found agricultural groups where older habits had prevailed. In the Andean foothills were the Puelches, closely allied to tribes of the Argentine plains, who had crossed the lower mountain passes between Villarica and Corcovado.

Far south, three racial divisions are admitted. Two of these are commonly known as Fuegians, and these scant tribes, Alakalufs of the southwest and Yahgans dwelling in the most southerly part of Tierra del Fuego, are a much more primitive folk than the few and diminishing Onas, a taller, round-headed race allied to the big Patagonians, and inheriting from their kin a fair degree of hunting skill. A number of the Onas have taken kindly to a shepherd's life since the creation of scientific Fuegian farms, but the Yahgans remain as they have always been known to history, a fish-eating, practically amphibious race, unreconciled to civilisation. The long-headed Alakalufs of the Chonos Archipelago have been forced, whatever their origin, into a mode of life much like that of the Yahgans, depending chiefly upon the sea for livelihood, using arrows and harpoons for killing fish, constructing canoes and showing skill as watermen.

Very finely worked arrowheads have been and are still being made by these southerly folk: Chilean specimens are among the best weapons of the kind found in the Americas. But neither the Onas nor Fuegians have ever constructed pottery, or know anything of the loom; shell-fish, seal-meat and fungus, forming their chief food, is frequently eaten raw. Alakaluf homes are huts of sticks, covered with skins, and carried by canoe from place to place. They have no chiefs, dwell in family groups, and we know nothing of their gods. They have as a whole resisted efforts to Christianise them.

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Araucanians

Among the great body of Araucanian speakers dwelling in Central Chile at the time of the Spanish conquest a more definite culture existed. Religious beliefs were probably genuinely Chilean, since they are quite distinct from the ideas found on the other side of the Andes. The supreme Deity Pillan was a sky-god with his dwelling in the volcanos, and was propitiated by that world-wide institution the medicine man, here called a Machí. Faith still survives, but so completely has soothsaying been relegated to women that a case has been known of a male Araucanian dressing as a woman and keeping up an elaborate life-long farce in order to hold the berth. "Cures" of the sick by fumigation and various drinks, and yearly ceremonies under the sacred canelo (a kind of cinnamon) tree, called forth the major symbols of the Araucanian cult, but there were neither temples nor images of deities.

The aboriginal Araucanian may be credited with the invention or adoption of chicha, a fermented drink made of berries or maize (and after the coming of the Spaniards, of apples from the trees planted by colonists or missionaries); of the poncho, well woven of guanaco wool, or later of sheep's wool; and of the cultivation of maize and the potato. Native to the West Coast, the potato grows wild today over the chief part of Chile and the adjacent islands, and formed a valuable contribution to the limited list of pre-Spanish foods. The use of certain seaweeds, with cochayuyo as the most succulent, in stews, was doubtless an aboriginal habit; it survives in South Chile, and in such coastal markets as that of Valdivia this dried seaweed is sold and eaten in enormous quantities. The seeds or nuts of the Chilean pine formed another part of the old diet. The

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method of cooking food in stone-lined holes in the ground is a native custom that remained in use among both "Indians" and Creoles in the more remote districts until recent times. There seems no doubt that the game called by the Spanish "chueca," played with a ball struck with curved sticks, is genuinely Chilean; it bears a strong resemblance to hockey. The bolas with which the Chilean *huaso* (cowboy) is so efficient was not known on the West of the Andes until after the Spanish conquest. But with the speedy adoption of the horse and rapid increase of cattle this implement from the Patagonian pampas became widely used. Within thirty years after the entry of Pedro de Valdivia into Chile the horse had spread throughout the inhabited part of Chile, and mounted Araucanians, hardy and expert, were giving battle to the cavalry of the Spaniard.

The Araucanian fought to retain his independence for over three hundred years. It was a contest in which he was doomed to fail in the long run, but he received from his enemies unstinted appreciation of his courage. The famous poem "La Araucana" written by Ercilla, a soldier in Valdivia's army, embodies a Spanish concept of chivalry rather than that of the Mapuche; his noble Indian is a mediæval Spanish knight, and the verses frequently quoted as proof of Araucanian virtues display chiefly the convention of generous sentimentality infusing the European literature of the sixteenth century. But undoubtedly the Araucanian possessed qualities that all the world agrees to admire: he defended his own, and showed tenacity and ability in that defence. From a series of tribes living loosely in family groups, obeying no overlord in times of peace, the native folk evolved a strong fighting confederation. The Toquis, or wartime leaders,

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supported by their Ulmen or district chiefs, developed genuine skill in warfare, and turned the whole of the tribes living south of the Maule into a mobile fighting community. The task was rendered easier by the old nomadic habits of a large part of the population.

The hostile relations between the earliest Spaniards and the Araucanians became crystallised with succeeding years, a feeling constantly renewed by women-hunting and house-burning raids upon the Spanish colonies, followed or preceded by ruthless attacks upon the Indian camps. The repeated treaties and parliaments arranged by the Spanish authorities with the Indian leaders during later colonial times were little more than symbols of optimism.

As far as Spain was concerned, good intentions towards the original owners of the Americas were frequently pricked to action by the priesthood, consistent advocates of the indigenous folk. When Charles V, pressed by Bartolomé de las Casas, published in the year 1542 the "New Laws" relating to the treatment of American natives it was with a determination to secure the Indians' well-being which was only surpassed by the determination of the colonists to make the greatest possible industrial use of these folk. "Our principal intention and will" declared the king, "has always been to preserve and augment the numbers of Indians, that they may be taught the articles of our holy Catholic faith and may be well treated as fellow men and our subjects, as indeed they are." The strict accompanying rules against enslavement or overwork of the Indians, and the minute instructions to the Audiencias and Procurator Fiscal were avoided with dexterity in the colonies from Mexico southwards, and not all the efforts of the missionary padres could render them effective, although these and similar laws

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were repeated by successive monarchs, and notably by Philip III, at the instance of that famous apostle of the West Coast, Father Luis de Valdivia. It cannot be said that, with regard to the Araucanians, this backing was either badly needed at the time or requited with gratitude; but it was followed by missionary efforts aiming at Christianisation of these wild and stubborn people. The Father Nicolas Mascardi, working in South Chile about 1670, "merited the crown of martyrdom that he received"; nevertheless the good Philippe de la Laguna took up the task, converting "Puelches and Poyas" in the mainland region opposite Chiloé, but making, apparently, little impression of permanence. The *intransigeance* of the southerners saved them for a time, for the more amenable Picunche and simple Changos, accepting the foreign yoke, rapidly diminished — the survivors losing caste with such finality that Ocampo, writing of West Coast conditions in 1610, declared that the Indians were generally downtrodden by the Negroes imported to supplement them as workers, "with ill-treatment both of word and deed, so that the Indians called the Negroes their lords, and the Negroes called the Indians dogs." It should be said that Ocampo's comment applied more to Peru than to Chile, where neither climate nor rich mines warranted the introduction of any large number of African slaves.

Today the Araucanian who resisted Spanish control is not in better case than the docile native of the more northerly part of the West Coast. Their definite overthrow as an independent people dates from 1882, when Chilean troops seasoned by the campaign with Bolivia and Peru marched across "la Frontera" and put an end forever to Araucania as a native stronghold in the middle of republican Chile. By this time Valdivia and

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Llanquihue had been colonised, and Araucania stood, fenced against north and south, in the way of free communication and development. A land reservation has been allotted in the province of Cautín, its limits beginning about half a mile outside the town of Temuco. Here dwell some 40,000 to 50,000 Mapuches. The majority are nominally Christianised, and in addition to the state schools, there are a couple of well-run British mission establishments near Quepe, where farming and handcrafts are taught. The younger folk take fairly readily to instruction, but on the whole the Indians prefer to withdraw themselves from contact with all foreigners, to live in the native *rucas*, huts of mud and thatch, to prepare food in the ancient manner, and to work only when a little money is needed to buy provisions. The women are adepts at the loom, weaving beautiful ponchos or mantos, and boldly patterned and tinted rugs and saddle-cloths. Now and again one meets in the streets of Temuco a group of Araucanians with rugs for sale: there are two or three women and the male head of the family, who is credited with doing no work but with careful shepherding of his household. The women have a certain good looks; the faces are extraordinarily broad, pale bronze in hue, with a touch of red on the cheeks; the hair is straight and black, plaited and bound with bright ribbons. The dress consists of a fold of cloth wound round the waist and held in place by a gaily patterned belt; a bodice, and a large shawl fastened with a big silver topo or pin. A wealthy woman will wear silver ornaments across the forehead, in the ears and on the neck in addition to the almost indispensable topo, and no Araucanian will sell these adornments from the person, although in hard times they may be taken to the pawnshop.

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Araucanian Indian, Spinning.
Note the solid wooden wheel of the country cart.



Araucanian Mother and Child.
The hide-and-wood cradle is slung upon the woman's back when she goes outside the hut.

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Racial purity amongst these survivors is not to be expected. There had been a considerable mixture of blood between North, South, and the transandine groups before the Spanish entry, brought about not only by wars and migrations, but by the custom prevailing among the indigenous folk of Central Chile of seeking wives outside the tribe. During the colonial period numbers of white women were systematically seized and held by the Indians, the resulting admixture of blood accounting for the comparatively blond strain seen in some of the Araucanian families.

Correspondingly, there was a certain absorption of native blood into the Spanish towns and settlements, Indian girls and children having passed into the possession of the Europeans from time to time: but racial traits have in both cases yielded a great deal to environment, and the mixed-blood youth of the Spanish sphere of influence is not remarkable for sympathy with the dwindling remnants of the Araucanian tribes. The child of the soil appears to be doomed here for very much the same reasons as the Red Indian is doomed in the states of the North American Union: he is irreconcilable and sullenly proud; has been conquered by slow pressure plus the spread of alcoholism and disease; and in spite of honestly-meant legislation on the part of the present rulers of the country, is progressively stripped of his remaining property. During a session of the National Congress in Santiago in early 1921, the Deputy for Temuco, Dr. Artemio Gutierrez, made a strong protest against the "constant victimisation" of the Indians by grasping exploiters. He attacked the municipal authorities for failing to defend the Araucanians, declaring that spoliation, even the robbing of the native huts, was permitted, and complained that although the State Government ex-

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empts the Indian from taxes the municipalities do not. "The Indians are not even masters of the two, four, five or ten hectares they operate, for they are only in control through the grace of the State," he declared, adding that many of these folk cross to the Argentine to escape their home troubles. Conditions of the kind seem almost unavoidable in a country rapidly filling up with a new population, against which the old resolutely sets its face; nothing perhaps is more typical of this attitude than an incident occurring at the ceremony in connection with the opening of the railway into Temuco town some years ago. Amongst the personages of the vicinity invited to attend the entry of the first train were the local Indian chiefs: they came, with an entourage of followers, bedecked in feathers, with fine ponchos, mounted upon fast horses, and were placed in a long double row, facing the line from either side. The assembly waited, fidgeted, talked; but the Araucanians sat motionless on motionless steeds, their swarthy, strong-featured faces set like wood. Presently the smoke of the engine was seen in the distance, and with a piercing shriek of the whistle Temuco's first railway train rushed forward. The people swayed, applauded, crowded to the rail's edge, exclaimed excitedly: but not an Araucanian moved so much as his eyes to glance at the steel monster. It thundered forward and passed; the crowd pushed across the track, waved hands and shouted; the Araucanians sat their horses, did not turn their heads to send a look at the people or the train, and in a few moments turned off and without a word or a change of expression galloped away. The ancient rebel refused to take the least outward interest in the white men's doings.

One sees in Chile a mirror of what is happening or has already happened in the major part of the Ameri-

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cas — the gradual extinction of an embryo civilization. Whatever beginnings the Chilean race had made towards the development of a social system, the evolution of a tongue and a cult, have been fruitless. In other continents the impression is given, very frequently, that the existing culture is built upon an older form, that it is the first seed of an ancient civilisation that has eventually flowered through whatever inner struggles and changes: in the Americas the developing civilisation has been introduced and superimposed, the young shoot of earliest native growth cut short and fatally withered.

The archaeology of Chile does not offer a field for study comparable with that of Mexico, Peru or Central America, with their splendid ruins of temples and burial grounds containing ceramic treasures, textiles and human remains. Because there is less that is spectacular, the Chilean area has been less adequately studied, and there is much work still to be done. Valuable researches have been made by the indefatigable José Toribio Medina, author of "Aborigines de Chile," published in 1888, and by R. E. Latcham, author of "Anthropologia Chilena," while the devoted energy of Dr. Aureliano Oyarzún in the field of physical anthropology is of the highest interest. Dr. Oyarzún has published many ethnological monographs and directs an excellent ethnographical Museum at Moneda 602, Santiago. A second collection in Santiago, containing much Peruvian pottery obtained during the War of the Pacific, is housed by the State, while a third is in the University buildings, possessing many specimens from Easter Island. Concepción owns a small but well-kept archaeological museum, but the scarcity of purely Chilean specimens displays the gap in present knowledge.

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CHAPTER XVII

EASTER ISLAND

A Lost Culture. — Fate of the Islanders. — The Statues. — The Bird Cult. — Wooden Carvings.

CHILE is the only South American country owning territory situated at a considerable distance from her shores; it was picked up, in fact, in 1888 as a kind of derelict child of Spain in whom nobody had much interest.

For Easter Island has little commercial importance; it has never yielded precious metals, includes no fair widespread lands inviting agricultural settlers, and has no woodlands nor a single river. The sheep and cattle bred upon the island are the property of one company, a British enterprise, and the natives are but a couple of hundred in number. The island lies in a lonely position, at the extreme west of the South Pacific series, and measures but thirteen miles in length and about seven in width. The hues of the land are sand and tawny; the sea is a faithful mirror of the turquoise sky; the dreamy heat of Polynesia endures throughout the year. Easter Island is lonely, lazy, unproductive, a little speck upon the broad breast of the Pacific.

But shut within its tiny compass, it holds one of the great mysteries of the world. It contains one of the keys to Polynesian culture, although it bears no apparent connection, as was once believed, with ancient American civilization. The strange, almost incredible evidence upon Easter Island speaks of a culture at once more advanced and more primitive than that

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which should be most intimately connected with it. For instance, the Easter Islanders speak a language which is a branch of a Polynesian tongue; in certain aspects, the culture of the old people is clearly allied to that of Polynesia in general. But — here is the problem of the ethnologists — Easter Island possessed a written language: the early European visitors put it upon record that the learned men of the territory could read the script of the wooden tablets of which specimens still exist. But Polynesia never had a written language, and pre-Spanish South America, the nearest mainland, was equally ignorant; the nearest country to the east with any idea of such script was Central America, in the Maya culture-area, and the nearest to the west was Sumatra.

The striking and eloquent evidence of Easter Island is fast disappearing. Two hundred years ago, when it was first visited by Europeans, stone statues stood, with their tawny head-dresses, as a thick fringe upon the coast, and there were perhaps a couple of thousand natives, divided into tribes spread over the land, among whom were the small clan of "wise men" who chanted from the script of the wooden tablets.

Today the natives are reduced to a handful grouped at one end of the island, the learned men have all passed away, and not a single statue stands upright upon the platforms of the coastal memorials. A part of the sea-border where a series of highly interesting carved rocks stand is being undermined by the sea, and in a few years little will be left. Science is therefore deeply indebted to the splendid work of the Routledge Expedition of 1914–15 in chronicling the exact results of a thorough examination of the remains, as well as for the indefatigable research work throwing new light upon this strange and ancient culture.

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Modern historical knowledge of Easter Island is scanty. It was discovered by the Dutch Admiral Roggeveen on Easter Day, 1722, when he was searching for a small island seen previously by the English corsair Davis. Roggeveen stayed here for a week, recorded the cultivation of sugar, sweet potatoes, bananas and figs by the natives, and noted the thirty-foot high stone statues that stood thickly upon the sea's edge. Fifty years later came a Spanish expedition under Gonzalez, who took formal possession for the King of Spain and had a map made. A few years later, in 1774, Captain Cook sailed into the western bay retaining his name, the expedition's botanist, Forster, leaving an account of the island; La Pérouse of unlucky memory was here in 1778. These later visitors saw little cultivation, thought the island poor, and, according to Cook, the natives no longer venerated the statues. When the British Admiralty sent the *Blossom* here in 1825 the figures near the shores were nearly all ruined.

Fate of the Islanders

Destruction of the natives and their peculiar culture proceeded at the same time. American sealers, short of hands, raided the villagers from the early nineteenth century, and when, about 1855, the exploiters of the Peruvian guano beds needed workers they sent slave-hunting expeditions to the Pacific. In the course of these raids one thousand men are said to have been taken to Peru, the prisoners including chiefs and "wise men." Principally at the instance of the French, who sent French-Chilean missionaries about this time to the island, a number were returned, but only fifteen reached Easter Island alive. These took back the germs of small-pox with them, and the remaining

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islanders were decimated by this disease and by phthisis, introduced, apparently, by the devoted French priests. This mission had converted all Easter Island to Christianity by the year 1868, and in the zeal of proselytisation brought about the destruction of quantities of the inscribed wooden tablets.

Commercial exploitation of the island by French traders operating from Tahiti led to the shipment of many natives to Tahitian plantations and the gathering of the 175 survivors into one small settlement at the western end of the island (at Mataveri) by the time that the *Topaze* called in 1868. This vessel took away the two stone statues that are, fortunately, now preserved in the British Museum. The American vessel *Mohican* came in 1886, the paymaster Thomson subsequently publishing an account of the conditions, and retailing a few folk-stories; a statue was excavated and taken to Washington. In 1888 the Government of Chile formally took possession of the island, retaining part of the western territory for the permanent use of the natives. The rest of the island is under the control of a British stock-raising company with headquarters in Valparaiso.

That is the brief record of Easter Island from the outside. But it has been increasingly plain since archaeology and ethnology took form as organised sciences some fifty years ago that the strange series of stone figures and wooden carvings emanating from Easter Island presented a magnificent puzzle. The work done with courage and ability by the Routledge expedition will perhaps only be adequately appreciated when the remains upon the island are no longer intelligible to the remaining natives. This time is rapidly approaching, and the resulting mystery adds to the picturesque quality of this lonely spot.

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The Statues

The majority of the figures bordering the sea were overthrown during tribal feuds. These figures originally stood at the end of sloping platforms of stone slabs, called *ahus*, upon which the bodies of the dead were laid, or under which they were buried; and the figure upon each *ahu* was crowned with an enormous "hat," five to eight feet in diameter, of reddish volcanic stone brought from one spot, a quarry on a slope of the volcano Punapau.

But these statues of the burial-places formed only one of the island series. The Routledge Expedition identified three roads, apparently connected with tribal ceremonies or rights, which were once bordered by giant figures; while on the interior as well as the exterior slopes of the volcano Rano Raraku, in the southeast, are scores of these strange carvings. The slopes of Raraku are almost the sole sources of the "image stone" used by the islanders, and in the quarries are to be seen huge heads in all stages of preparation, some completed and in process of removal. The figures vary in size, some weighing 40 to 50 tons, but all follow a similar design: a tremendous face, with closed lips, and long nose with a concave bend. The back of the head is so narrow as to be almost negligible, but a distinguishing feature is the length of the ear-lobes, distorted to four or five times the natural size. The back is carved with some care, and a curious design that includes circles is often marked out upon it; the shoulders are well shaped, but the arms and hands are shown by a simple and well-conventionalised method, the fingers frequently meeting across the front of the waist. At the hips the carving ceases, the rest of the stone being generally shaped into a peg for convenient

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erection. Severely simple and quite primitive as the figures are, there is a fine dignity, a repose, about the slightly up-tilted faces that is impressive; the effect of the statues *en masse*, as they are still to be seen, many of them erect, with the faces looking out from the mountain on the slopes of Raraku, is remarkable, even through the deadening medium of a black and white photograph. Why the statues were carved in such number — there are 150 above the crater lake of Raraku — and why the work ceased, is one of Easter Island's problems. The unanimity of design, its peculiar conventions, and the skill and decision of the workmanship, suggest a "school"; and as the writers and readers were a special inner guild, so, apparently, were the image-makers. It is true that there seems to have been at one time an itch for carving, for in certain regions every piece of stone that projected from the ground has been carved as it lay, without any attempt to remove it: perhaps, a beneficent influence was created with each serene carved face. But it is certain that many of the statues were set up to mark boundaries, and were so well known that their special names still survive. The larger figure now under the portico of the British Museum, for instance, which comes from Orongo, is "Hoa-Haka-Nana-Ia," which may be rendered in English, "There is a friend who watches"; the inference certainly being that this statue stood on a boundary. The image-stone is a fairly soft volcanic rock, and the tools used, many of which have been found near the images in the quarries, were pieces of harder stone, roughly chipped, bearing a striking similarity to the tools found near Stonehenge, and used in dressing the monoliths. The natives had, of course, no metal. A people of extremely simple habits, they neither made any kind of pottery nor wove cloth,

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using beaten bark (*tapa*) for body-coverings. Food was cooked in holes in the ground, lined with stones and heated. Fresh water was and is obtained only from the crater lakes or other collections of rain. The people seem to have lived contentedly in the many caves on the island, but also built huts of a uniform pattern: in shape long and very narrow, the hut had a floor of stones edged with a little wall of slabs; from this sprang a series of twigs, bent and interlaced together at the top, and covered thickly with leaves. Food consisted chiefly of the sweet potato, a kind of sugar-cane, and bananas; there was no animal upon the island yielding meat except a small rodent, but the islanders were expert fishermen, and also, in the season, caught great quantities of the sea-birds that visit the nearby rocks to breed.

The Bird Cult

The Routledge Expedition, with good fortune and exquisite patience, discovered and elucidated the extremely interesting story of the Bird Cult of Easter Island. Dependent upon the sea-birds' coming for an important part of their food-supply, the islanders evolved a series of rites connected with the event. The chief ceremony was concerned with the securing of the first egg, deposited on Moto Nui, one of three little rocky islets opposite the highest peak of Easter Island, Rano Kao, at the southwestern edge. At a spot called Orongo, on a slope of Rano Kao, are still to be seen fifty stone huts, where the people went in September and waited for the sea-birds' coming. Several birds visit the rocks, but it is the egg of the Sooty Tern, known as *manu-tara*, that was the islanders' objective; competition among the watchers was keen,

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and only members of the temporarily most powerful clan, or their friends, could take part in the contest. The competitors, men of substance, waited in special houses, but deputed servants to swim to the islet when the season was at hand; carrying food, these men lived in a big cave, whose carvings are still to be seen, until the curious scream of the birds heralded their coming. When the first egg was found, the deputy shouted the news to his employer (who shaved his head and painted it red), and swam ashore with the precious egg in a tiny basket tied to his forehead. The victor and his rejoicing party danced ceremonially, carrying the egg, all the way from the west to the eastern end of the island, where the bird-man went to a special house for a year, at Orohié, on Rano Raraku's slope, strict tabu being maintained for five months. Each old egg was as a rule given to the incoming bird-man, and by him buried on Raraku.

Mrs. Routledge says that apparently the last year in which the dominant clan went to Orongo to await the birds was in 1866 or 1867, although the competition for the first egg survived for some twelve years afterwards.

Legends of the Easter Islanders appear to point to their racial origin upon other Pacific islands, and migration in at least two separate periods, a tradition which is confirmed by the divergence of types found, and the number of shades, from dark brown to nearly white, of the skin of the different people. Stories of the wars between the "Long Ears" and the "Short Ears" suggest that the image-makers, always depicting elongated ear-lobes, differed in tribal attributes from their opponents. None of the native settlements upon Easter Island appear to be of very old establishment.

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Wooden Carvings

A curious and beautiful series of small objects is typical of the peculiar culture of Easter Island. The natives had, of course, no metal, and it must have been with stone or hardwood tools that quantities of small wooden figures made in former days in Easter Island were carved. It is not known with certainty whether the territory formerly included a larger number of trees, offering timber for this work and for the larger canoes of which tradition speaks, or whether use was made of driftwood. Today there are no trees of the quality shown by the figures.

The most striking of the old wooden objects represent human figures — rarely, those of women, and most commonly, of singularly emaciated men. Specimens of the latter are beautifully finished, and the head shows "long ears" and faces with "imperials" or little beards, and marked aquiline features, quite distinct in type from these of the conventional stone faces. These statuettes are from 29 to 30 inches in height, the carving bearing a technical resemblance to the "lizards," another highly-finished series. Crescent-shaped breast ornaments, formerly worn by women, have almost entirely disappeared, although a few specimens survive, one, in the British Museum, bearing inscriptions. The dancing-clubs or paddles belong to another series of high artistic merit, but the most interesting of the wooden carvings from an ethnological point of view are the tablets engraved with signs whose meaning was lost when, sixty years ago, the last of the *ariki* (learned men) died, a slave in the guano fields of Peru.

Tradition upon the island states that the wooden figures were originally made by a great ariki, named

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Tuukoihu, one of the first immigrants to Easter Island from the western islands; but the art of wood carving still survives feebly, chiefly in the manufacture of objects for sale, as antiques, to unsuspecting visitors.

The natives today wear clothes, a habit which has probably tended to render them more liable to disease; they number about 250. Retaining their two-hundred-year-old reputation of being courageous and persistent thieves, they have however lost many of their ancient arts and are not addicted to regular work. But they are of a physically fine type, appear to possess a gift of wit, and, unless when instigated to anger by their equivalent for medicine men or women, are an amiable people. They formerly tattooed the body in definite conventional patterns; their religious cult was chiefly connected with respect to ancestral dead, and ideas of spirits, kindly or the reverse. A certain clan, the Miru, assumed possession of supernatural powers, and specially gifted men and women were given the usual homage of the medicine man. But religious ceremonies, as apart from the burial rites, initiation into the bird cult, and, later, ritual connected with the visits of European ships, do not appear to have existed.

Of weapons, quantities are found; black obsidian flakes, roughly chipped at edges, with a short stem bound to wooden handle, are typical.

Exterior communication with Easter Island depends upon the Chilean Government, sending an Admiralty vessel yearly, and upon the visits of a sailing ship sent to bring away the wool clip, product of the flock of the 12,000 sheep, by the commercial company of Valparaiso leasing the main part of the territory.

The Chilean vessel sent of recent years on the trip is the training ship *Baquedano*, a corvette fitted with auxiliary engines.

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Visits of the British company's boat are rare, and the representatives at Mataveri are cut off from the outside world for long periods. During the early months of the war five vessels of the German fleet appeared in Cook's Bay: the *Scharnhorst*, *Gneisenau*, *Leipzig*, *Nurnberg* and *Dresden;* they used the island as a naval base for six days, gave out the first news, considerably garbled, of the war, and went away, first to sink the *Good Hope* and *Monmouth* off Coronel and later to meet their fate at the Falklands. The *Prinz Eitel Friedrich* also entered on December 23, went out and captured a French barque, and sunk her inside the three-mile limit in Cook's Bay, after landing her crew and that of a British sailing ship taken off Cape Horn.

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CHAPTER XVIII

A NOTE UPON VITAL STATISTICS

TODAY Chile calculates her area at over 300,000 square miles, with a population not far exceeding four millions. There is plenty of room for at least twenty million people, although one must rule out from possible settlement certain areas of the rugged south, and of the arid north, where, however, scientific irrigation may bring unsuspected regions into the realm of cultivated and settled country.

The growth of population in Chile has not kept pace with that of some other of the South American nations, partly because definite efforts to invite immigration have long been discontinued. Numerical success has not always been accompanied by peaceful assimilation, and Chile, with no great untouched areas to fill, prefers to wait for the natural increase of her people. Since 1820, when the total Chilean inhabitants did not reach one million, the number has quadrupled, a few hundred thousand persons of foreign blood adding, during the century, to the stock; today the foreign-born residing in the country are calculated at 135,000, of whom 100,000 are men.

A brief examination of the population figures of Chile shows some illuminating details, and nothing is clearer than that the apparently rapid growth of certain regions is not due entirely or even chiefly to an influx from outside Chile, or to natural increase, but to a shifting of the workers from one point to another in response to industrial demand. Antofagasta city,

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which did not figure at all in the census of 1875 counted 8000 people ten years later, and 70,000 in 1919. This concentration is of course a result of the magnificent rise of the nitrate industry, and while a proportion of the employés are Bolivian and Peruvian, most are drawn from more southerly Chilean districts. Valparaiso, always a prosperous city, despite recurrent earthquakes, shows a progressive rise during the last half century from 70,000 to 220,000 people, its lovely residential suburb, Viña del Mar, counting 35,000 more; Santiago also has made strides in accord with her political, social and financial status, the population numbering 425,000, as against 116,000 in 1865 and 333,000 in 1907. Concepción is another city showing legitimate and steady increases — 75,000 people today as compared with 14,000 fifty years ago. Iquique, another of the new nitrate towns, has about 50,000 people, appearing in statistics, like Antofagasta, only twenty-five years ago.

Agricultural and industrial Chillán, in the south, has over 40,000 people; Temuco, opened to the general population of Chile only after "the Frontier" was broken down in 1882, made its first appearance in the census of 1885, and has now 35,000 people. Valdivia, with but 3000 people in 1865, now has 30,000.

But Copiapó, with diminished mining, has a few thousand people less than she counted in 1865; Lebu has lost half its people since 1875, and has now less than 3000; Tomé has been practically stationary for fifty years, for similar industrial reasons.

Two new agricultural and pastoral centres in the south show sustained activity, Puerto Montt and Punta Arenas. Puerto Montt, like Valdivia, drew a strong part of its population from Germany and has today 8000 people; Punta Arenas, with less than two

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hundred inhabitants in 1865, has 25,000 people. Forty per cent of these are calculated to be foreigners, chiefly Scots, or Falkland Islanders of Scots blood, and Yugo-Slavs; the only other city showing so large a proportion of foreign-born residents is Tarapacá, while Antofagasta has 16 per cent of non-Chileans.

Vital statistics in Chile are carefully kept and promptly published; they do not always give satisfaction. A storm of protest was roused, for example, in the Santiaguino press, led by the outspoken and admirably edited *Mercurio*, when Santiago's figures for the first four months of 1920 were issued. Infant mortality was shown to be extremely high in that period, — 5237 deaths to 4777 births, — a fact which called for investigation by the health authorities, while stress was laid upon the listing of 2402 of the births as illegitimate. "If on the one hand our population does not increase in the normal proportion, while on the other the race is debilitated in the manner revealed by the figures, it is useless for us to claim proudly that we are a well-defined and homogeneous nationality," declared the *Mercurio*, and a cloud of articles appeared to account and to suggest remedies for the conditions shown by the official figures.

As regards infant mortality, there seems to be no doubt that the rate is high for Chile, a fact surprising in view of the healthful climate and abundance of good food produced in the country. Santiago province registered during 1919 a death rate of children under one year of 37 per cent, nine thousand dying out of twenty-four thousand born. Many other towns registered high mortality rates, but inside this figure. Of these same 24,000 babies, 10,000 were born out of wedlock.

The two sets of figures no doubt have relation to each other, but it should be said at once that large

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numbers of the children officially registered illegitimate are only officially so regarded. Civil marriages only are recognised by Chilean law, and if this ceremony is omitted the couple are officially unmarried although a priest may have united them.

In the country districts, distances are far and marriage fees no light matter to an agricultural population; many stories are told of young couples making a long journey to the nearest office where a wedding may be performed, finding it shut, and returning to set up house without being able to make another attempt at matrimony. The clergy are accused, perhaps without sufficient reason, of setting their faces against the civil marriage, and there was certainly a period in Chile, when the laws were first enforced, when devout children of the Church who refused to go through the official form were forbidden the religious ceremony, and marriages amongst the more obstinate circles practically ceased.

With regard to mortality, no explanation can excuse the loss of so large a part of the precious life blood of the country. One of the reasons is certainly to be looked for in the economic independence of many women in Chile. The woman wage-earner, of whom there is a larger number than in most Latin-American countries, is not always disposed to risk permanent association with an unsatisfactory mate — for divorce is scarcely known in Chile; and where no special social disability results, she prefers freedom. The whole question is one in which the future of Chile is concerned, and attracting the attention of thoughtful Chileans, has called for better housing regulations and schemes for the education of young mothers in infant care. A group of the admirable Club de Señoras, the characteristically Chilean association of wealthy, force-

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ful and intellectual women of Santiago, is working towards the solution of a serious social problem.

Through the force of economic circumstance, the question of the employment of women is not one which is likely to be reconsidered in Chile.

Large groups of men are drawn to isolated camps in the copper and nitrate fields, and there is a resulting tendency for women in the other regions to take up work in factories, public services, etc.

It was the War of the Pacific that brought women into the employ of the street-car companies in Valparaiso and Santiago, for with the men absent in the army there were gaps in the ranks of workers. When the men returned their female supplanters refused to give up their berths, and remained victors. One feels sympathy with their spirited attitude, and, despite the unlovely dress imposed by the German tramway owners in early days (which includes the apron of a *hausfrau*) they make a generally good impression. It is doubtful whether such work is well suited to women; the hours are long — the old (now altered) time schedule kept certain women at work as conductors for fourteen hours a day — and the strain is plainly great upon feminine endurance.

Employment in the Chilean post-offices is not within the same category, but one becomes in South America so well accustomed to the general and graceful habit of service to women that a certain mental adjustment is required before one becomes inured to receiving service from them. If the far-famed Chilean politeness, a genial flame of nation-wide brightness, suffers an occasional eclipse, it is almost invariably due to the widespread employment of women.

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PROVINCES AND POPULATION OF CHILE

Province	*Departments*	*Area in Sq. Kilometres*	*Population, Census of December, 1920*
Tacna	Tacna, Arica, Tarata	23,306	38,902
Tarapacá	Tarapacá, Pisagua	43,220	100,533
Antofagasta	Antofagasta, Tocopilla, Taltal	120,183	172,330
Atacama	Copiapó, Chañaral, Freirina, Vallenar	79,531	48,413
Coquimbo	La Serena, Elqui, Ovalle, Coquimbo, Combarbalá, Illapel	36,509	160,256
Aconcagua	San Felipe, Petorca, Putaendo, La Ligua, Los Andes	14,000	116,914
Valparaiso	Valparaiso, Quillota, Limache, Casablanca	4,598	320,398
Santiago	Santiago, La Victoria, Melipilla, San Antonio	15,260	685,358
O'Higgins	Rancagua, Cachapoal, Maipo	5,617	118,591
Colchagua	San Fernando, Caupolicán	9,973	166,342
Curicó	Curicó, Santa Cruz, Vichuquén	7,885	108,148
Talca	Talca, Lontué, Curepto	10,006	133,957

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Province	*Departments*	*Area in Sq. Kilometres*	*Population, Census of December, 1920*
Maule	Cauquenes, Constitución, Chanco, Itatá	7,281	113,231
Linares	Linares, Loncomilla, Parral	10,279	119,284
Ñuble	Chillán, San Carlos, Bulnes, Yungay	9,050	170,425
Concepción	Concepción, Coelemu, Talcahuano, Puchacai, Lautaro, Rere	8,579	247,611
Arauco	Lebu, Arauco, Cañete	5,668	60,233
Bio-Bio	La Laja, Nascimiento, Mulchen	13,863	107,[illegible]72
Malleco	Angol, Collipulli, Traiguén, Mariluán	8,555	121,429
Cautín	Temuco, Imperial, Llaima	16,524	193,628
Valdivia	Valdivia, Villarica, La Unión, Rio Bueno	23,285	175,141
Llanquihue	Llanquihue, Osorno, Carelmapu	90,066	137,206
Chiloé	Ancud, Quinchao, Castro	18,074	110,331
Territory of Magallanes		169,251	28,960
Total Chilean Territory		750,572	3,754,723

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CHILEAN TERMS

Aji: small red peppers, highly aromatic, grown in the northerly regions; used extensively in Chilean cooking.
Alerce: a tall conifer of South Chile; fine lumber. *Alerzal*, a wood of *alerce* trees.
Algarroba: the sweet pod of the minosa-like Algarrobo tree (North).
Algarrobo: (al carob, Arabic), term applied by Spanish to small thorny tree bearing pods used as cattle fodder (North).
Antofagastino: native of Antofagasta.
Arenal: sand desert, sand-laden wind.
Atacameño: native of Atacama.
Avellano: small tree (Central and South) yielding the avellana, a soft-shelled nut resembling the hazel.
Bolas: throwing weapon used by mounted cattlemen or hunters; long pliable rope or hide thong with heavy weights at either end, flung in such a manner that it enwraps and twists about the legs of the animal pursued.
Boldo: a small tree yielding the drug *boldaina.*
Boquete: a mountain pass.
Brasero: deep dish or bowl, usually made of copper or silver, filled with charcoal and heated for cooking purposes or to warm a room.
Butre: smallest wild bamboo.
Cajón: a gap in the high mountains.
Caliche: strata containing nitrate of soda.
Camanchaca: fog or mist over the northern plains.
Cancha: depot (for ores, North); gun-park; tennis-court.
Candeal: hard brown wheat of the southerly provinces.
Canelo: sweet-smelling small tree (Central Chile), the "South American cinnamon."
Capacho: bag used for carrying ore, made of hide.
Capataz: foreman of workers.
Carbonado: a Chilean soup.
Cardón: applied to various thistles and especially to the big blue-flowered *Cynara carduncułus*, growing through Central and South Chile, but the term is also used for many spiny plants and leaves, for the wild artichoke and the thorny leaves of the Puya.
Cateo: the search for a mine.

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Cazuela: thick stew, made with chicken, rice. potatos, aji, etc.
Chacolí: country wine, lightly fermented.
Chacra: a small cultivated plot of land.
Chagual: applied generally to *Puya chilensis* or *Puya coarctata*, growing freely from the sea border to Andean slopes in all Central Chile: the tall spike of blue, or in other varieties yellow flowers is the "chagual," while the spiny leaf is called "cardón" and the big thorns used as knitting-needles; the flowers are gathered for their honey.
Chaucha: twenty centavo piece.
Chañar: small tree (North), yielding date-like fruit. *Chañaral*, group of chañar trees.
Charqui: dried meat ("jerked" beef).
Charquican: Chilean dish made with charqui.
Chicha: heavy liquor made from grapes or apples; formerly made from wild berries by Indians of Chile.
Chileno (a): native of Chile.
Chillehueque: Araucanian name for the Guanaco.
Chilote: native of Chiloé.
Chinchilla: small fur-bearing rodent, today scarce and valuable.
Chingana: wattled booths set up at fairs for the assembly of musicians and dancers.
Choapino: saddle-cloth, woven of thick black-dyed wool (South).
Choclo: maize.
Cholo: a Peruvian. Cf. *Godo*, a Spaniard; *Gabacho*, Frenchman.
Chonta: palm growing on Más a Tierra island (Juan Fernandez group), yielding a fine wood of which walking sticks and canes are made, prized for the bright yellow and black pattern of the wood. The young head of the palm is cooked and eaten as a "cabbage."
Choros: large mussels found off Chilean coast, eaten in great quantities.
Chuño: arrowroot; or frozen and dried potatoes.
Chuso: a stupid fellow.
Cochayuyo: sea-weed, stewed in the south for soup, like *luche*.
Coihue, *Coigüe:* large tree (South), yielding hardwood and a red dye.
Colihue: wild bamboo. *Colihual*, bamboo thicket.
Condor: giant vulture (Sarcoramphus) of the Andes, ringed with white about the neck. Appears on Chilean coat-of-arms together with the native deer *huemul*. Araucanian name. *manqui*.
Congrio: a Chilean fish, generally liked; as also is the *corbina*, *robalo* and delicate *pejerey*.
Copihue: wild vine with a large, rosy bell. The national flower of Chile.
Coquimbano (a): native of Coquimbo.

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Cueca: a popular soup.
Cueca, or *sama-cueca:* the Chilean national dance.
Culén (*Cytisus Arboreus*): prophylactic against witchcraft: leaves dried to make a medicinal tea and gum from stalks; well known as a vermifuge.
Cupilca: thick liquid or thin paste made with toasted and powdered wheat or maize and mixed with chicha or chacolí.
Curado: "half seas over."
Curanto: Indian dish of meat and vegetables, originally cooked in a stone-lined hole in the ground.
Cuyano: a native of the Argentine. Properly, applied to one born in the old province of Cuyo, formerly including the then Chilean provinces of Mendoza, San Juan and San Luis, but used familiarly of any one born in Argentina.
Despacho: shop or store on an estate or mine where goods are sold to employés.
Empanada: a paté, filled with chopped meat, onions, gravy, etc., and served hot.
Estrada: raised bench generally built across the end of a living room, used in colonial days as a seat for all the ladies of the family.
Fernandecino (a): native of the Juan Fernandez group of islands.
Floripondio: large white pendant flowers of the *Datura arborea,* growing as a fairly large tree in Chile. Infusions yield the *huanto,* a drugging drink used in regions of Quechua influence by witch-doctors to obtain insensibility and visions; *huanto* is similar in effect to the *natema* of Amazonian headwaters; *caapi* of Eastern Ecuador, and *ayahuasca* of Peru.
Fundo: a general farm. *Fundo de rulo,* a non-irrigated farm.
Futre: a pretentious person; in copper mines, a ghost or imp.
Garúa: fine rain, like a "Scotch mist" (North).
Guachuchero: a liquor-smuggler (mining regions).
Guagua: a baby (Araucanian Indian).
Guaira, guairachina: little smelters built on hilltop to catch the breeze.
Gualcacho: (Araucanian) plant yielding a small native grain similar to but more delicate than maize.
Gualhue: (Araucanian) damp ground, usually near a river, suitable for maize cultivation.
Guanaco: ruminant quadruped, still found in considerable numbers in the wild mountainous regions, all the way from the Bolivian border to Tierra del Fuego. Rugs and coverings made of the thick tawny hair, and the flesh eaten by Indians. In Ch. slang, a "guanaco" is a country bumpkin, a "hayseed."
Guaso, huaso: a cow-boy (Central Chile).

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Guemul, huemul: the native deer of Chilean woodland.
hacer-se Sueco: to be unintelligible.
Huacho: properly, a motherless calf, but applied to any waif.
Huasca: a whip: originally applied to a supple creeper or liana of the forests, used as a cord or thong.
Humita: maize paste.
Inquilino: farm-worker on a Chilean estate, on special conditions. Usually given free house, land for cultivation, rations, small wages, and use of implements.
Invernado: wintering-place for cattle.
Litre: a tree used for fuel. Leaves poisonous, affecting persons in the tree's shade.
Llareta (*Lareta acaulis*): umbelliferous plant of low growth, spreading to an enormous size like a giant mushroom: grows in uplands of Tacna and Antofagasta, and is cut, dried on lower slopes, and brought down to inhabited regions to serve as fuel.
Luche: sea-weed used for making stews.
Lumo: a large tree supplying good timber.
Machi: medicine-woman of the Araucanians.
Maiten: tree with white wood. Leaves infused to obtain a febrifuge.
Mampato: the small Chilean pony.
Manco: properly, a one-armed man, but applied to broken-down horses.
Manta: a finely-woven poncho, often of alpacá or vicuna wool. *Manto*, black shawl worn by women when attending church services.
Mineral: a mineral reef or group of mines.
Molle: small tree with sweet-scented flowers and medicinal berries, formerly used by Indians for making chicha.
Paco: slang term for a policeman.
Palqui: plant yielding mauve or yellow flowers: ashes used in soap-making.
Pampa: a plain. *Pampas salitreras*, nitrate fields.
Panqui or Pangui (*Gunnera peltata*): plant with large rhubarb-like leaves, yielding a black dye and tannin. Grows in great quantities upon the islands of Juan Fernandez. *Pangal*, a mass of Pangui plants.
Penquisto: native of Penco: applied to inhabitants of Concepción City, the former Penco, or of Concepción province.
Pirquén: system by which the miner (pirquenero) works a vein on his own account, paying a royalty on production.
Politiquero: a professional politician: used derogatively.
Porotos: beans.
Porteño: native of "the port": usually, of Valparaiso.
Pudu: the miniature deer of South Chile.
Pulpería: store at a mine or nitrate oficina.

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Puno: mountain sickness due to rarefied air: more commonly called *soroche* in Peru and Bolivia.

Puntarrense: native of Punta Arenas.

Puya (Puya chilensis, formerly listed as Pourretia coarctata): group of plants common in Chile, belonging to the genus Bromeliacrae, different varieties bearing light or dark blue or yellow flowers arranged in a huge spike; large orange stamens. The spiny leaves form a thick rosette at the base, in a form similar to that of the related pineapple. Feature of landscape in Central Chile, on spurs of hills. The light pith of the mature stem of the tall flower-spike, more buoyant than cork, is used for fishing floats and for sharpening razors.

Quelghen: the Chilean native strawberry, remains white when ripe, very sweet.

Quila: the small climbing bamboo of the South.

Quillay: a tree yielding a saponaceous bark much used in Chile.

Quintral: a beautiful scarlet-blossomed parasite upon poplar and other trees.

Quisco (*Cereus quisco*): columnar cactus of Central and northerly Chile, called "torch thistle"; thorns used as needles; grows 12 to 18 ft.

Raule: a fine timber tree with red wood.

Roble: properly, oak, but applied to the Chilean beeches (South).

Roto: a "ragged man," originally: now applied to any worker.

Salitre: nitrate of soda.

Santiaguino (a): native of Santiago.

Siutico: "low-class" person; same meaning as *mediopelo.*

Soroche: See *Puno.*

Tajamar: wall or bank built to restrain the flood of sea or river; that of the Mapocho river a famous promenade in Santiago.

Templados: people in love; same meaning as *encamotados.*

Ulmo: drink made of parched and ground corn or maize (Indian).

Valdiviano: a native of Valdivia; also name of a vegetable soup.

Ventisqueros: glaciers; frequently driven by wind into frozen snow pinnacles, commonly called in Chile "nieves penitentes."

Williwaw: a squall in Magellanic territory (Scots).

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